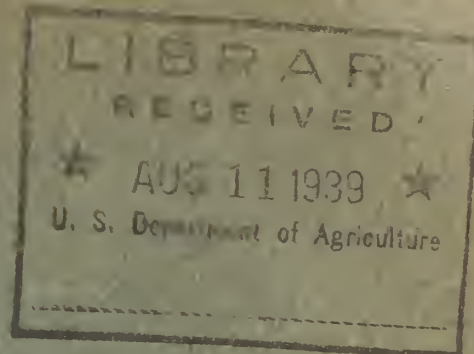


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UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
Region Eight
Albuquerque, New Mexico



Hugh G. Calkins
Regional Conservator

RECONNAISSANCE SURVEY OF HUMAN DEPENDENCY
ON RESOURCES IN THE RIO GRANDE WATERSHED

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Regional Bulletin No. 33
Conservation Economics Series No. 6
December, 1936

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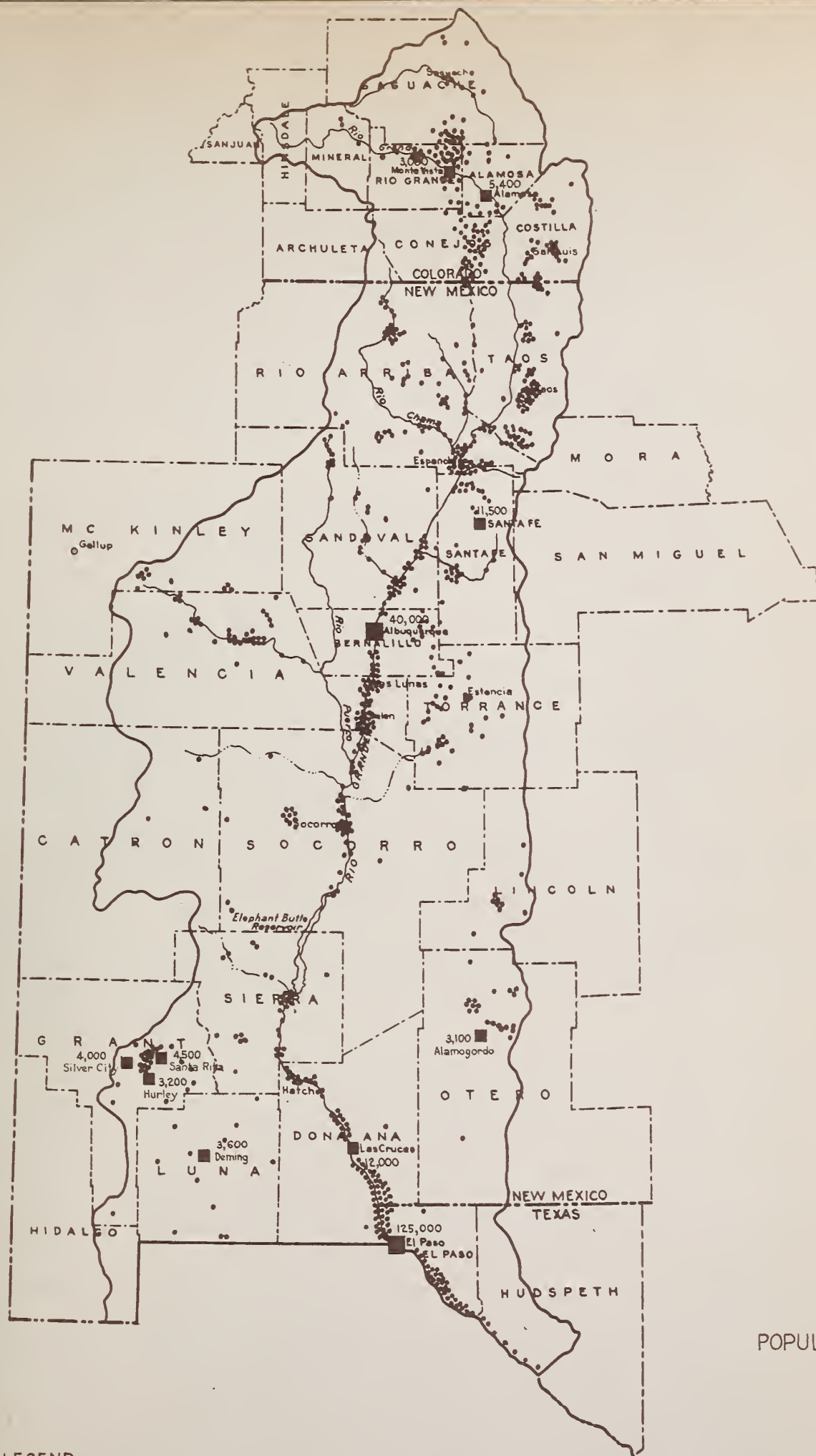
RECONNAISSANCE SURVEY OF HUMAN DEPENDENCY
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POPULATION

LEGEND

- 3,600 Urban Area
- Each dot = 200 persons

UNITED STATES
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When any agency or group of agencies undertakes a program of watershed conservation a series of complex problems arise. Any such program necessarily involves an adjustment of two sets of relationships--those among soil and water and plant life, and those between all of these relationships and human activity. A variety of disciplines are necessary in order to understand watershed relationships, disciplines which deal with every important aspect of soil and water, plant life, animal life and human life as these relate to the causes of destruction within a watershed. Numbered among these disciplines are agronomy, engineering, range management, soil science, forestry, and sociology.

Sociology is here to be understood in the broad sense which includes all of the social sciences in general and, in particular, the logically inseparable fields of economics, sociology, and ethnology.

The function of sociological investigation in watershed management is clear and specific. Since the principal causative factor in watershed destruction is the human use of that watershed, to the sociologist belongs the responsibility of describing and interpreting that use, and relating it to the total complex of factors which define the potentialities for conservation or for destruction of that watershed. From an understanding of the nature of a particular type of use and the specific conditions under which it exists, adjustments of human use to physical

conditions can be projected.

A sociological survey of the Rio Grande Watershed is under way. This survey, in terms of its procedures, is differentiated into three essential levels.

1. The first of these is the level of reconnaissance description. Description on this first level is designed to introduce a primary organization into undifferentiated, extensive material. Since from the point of view of human use of resources a watershed is not necessarily or even usually a homogeneous area, one of the major functions of this description is to mark out within the watershed areas which are relatively homogeneous in terms of human relationships to resources. Each of these areas is then subject to unitary analysis for closer definition of problems and for the determination of the most appropriate instruments of study.

2. The second level is the level of measurement, the measurement of human dependence upon resources. Study at this level is termed the "human dependency survey". This survey is not similar to the standards of living studies which aim at a single expression in terms of an average or a typical case of the magnitude and character of consumption of an entire group or society. The human dependency survey of the Rio Grande attempts (a) to measure dependency of people upon different

resources, using the amount of livestock and agricultural land owned and the amount of income from wage work as measures of dependency; (b) to describe dependency in terms of the total (1) range of variation by consumption groups which obtains, rather than in terms of averages.

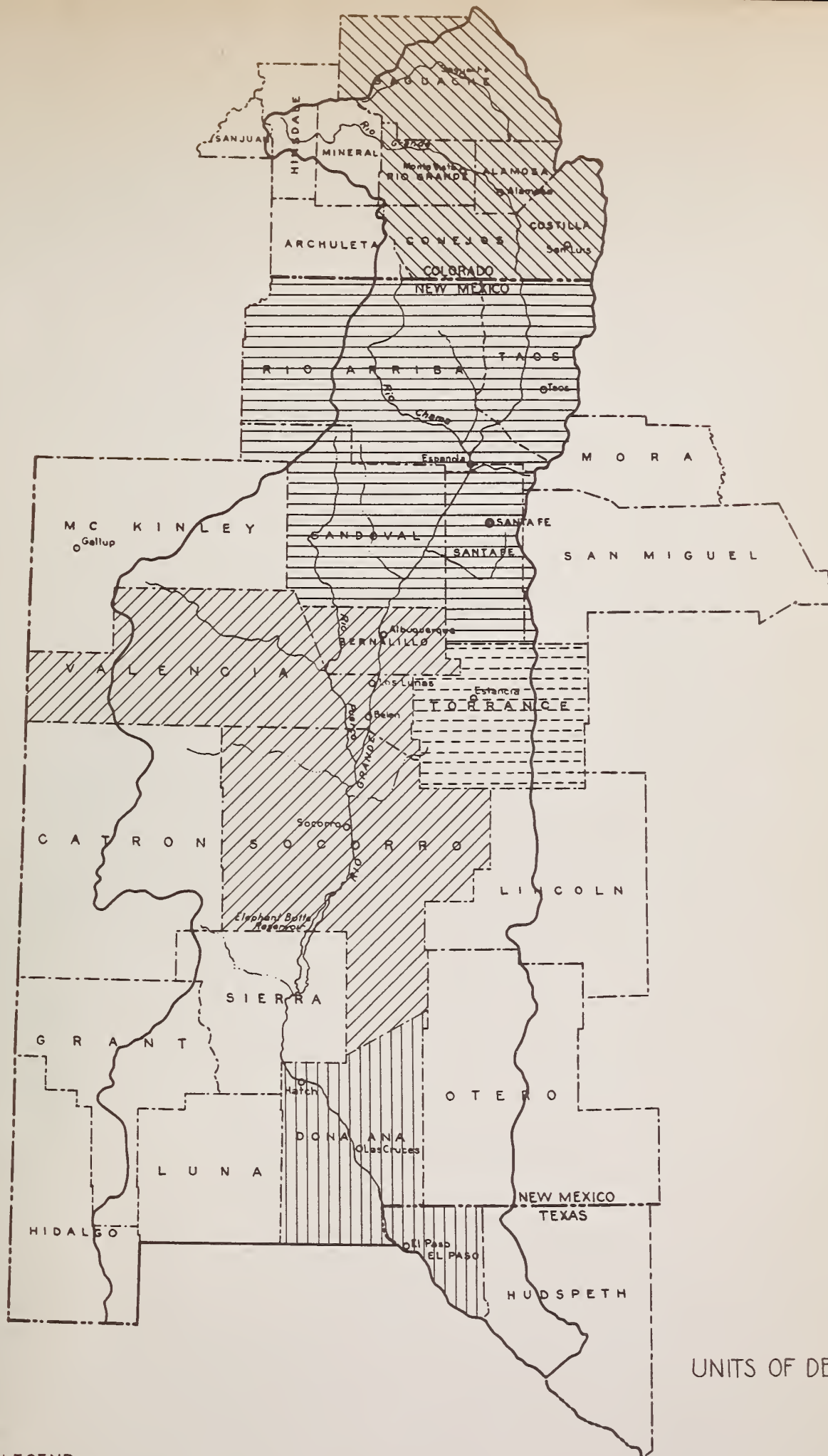
3. The dependency survey does not provide basic material for the understanding of the nature of productive activity; it attempts only to measure the results of such activity. Interpretation of the results of measurement can evolve only from a clear understanding of all the interrelated activities directed toward the provision of livelihood. This understanding evolves neither from individual insight nor from a lifetime of experience. It emerges only from organized studies of the institutional activities of a people. These studies represent the third level of the survey--the level of interpretation.

Studies at these three levels of investigation and understanding constitute the sociological survey. Interpretative studies have been made in one section of the Rio Grande watershed. Studies, at this third level, of ranching economy and of irrigation agriculture have been projected. A dependency survey at the second level is nearing completion in one of the

(1) A consumption group is a group of individuals habitually funding and sharing all resources.


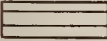



areas within the watershed. The accompanying papers represent the first level of the sociological survey of the Rio Grande Watershed, the level of reconnaissance description. The areas described are shown on the accompanying map.

UNIT DESCRIPTIONS



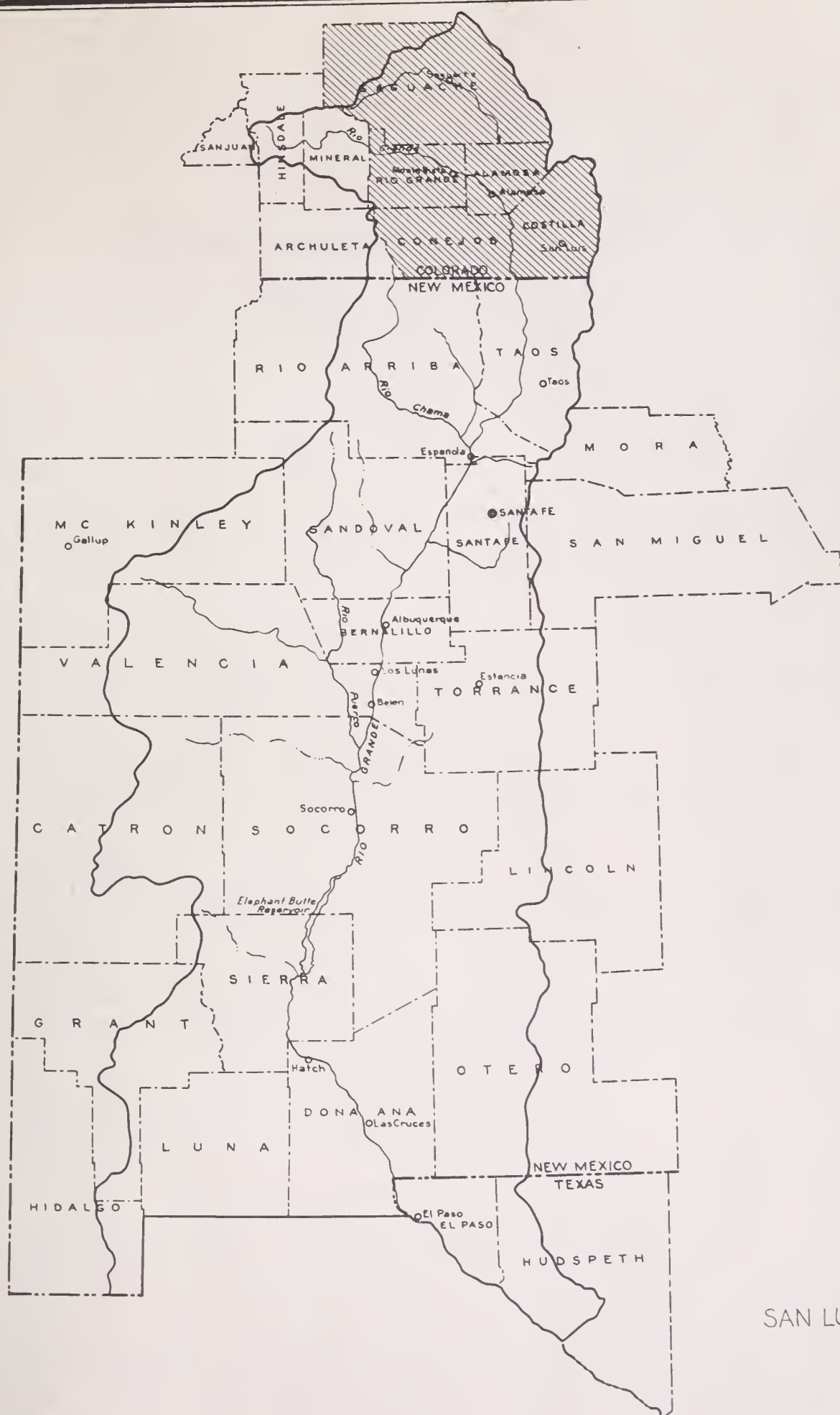
UNITS OF DESCRIPTION

LEGEND

-  San Luis Unit
-  Espanola Unit
-  Middle Rio Grande Unit
-  Estancia Unit
-  Mesilla Unit

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San Luis Unit



SAN LUIS UNIT

LEGEND



U S. Census Data. Colorado Yearbook, 1934

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The San Luis Valley is an area of approximately 5 million acres lying between the Sangre de Cristo mountains on the east and the San Juan mountains which form the Continental Divide on the west, and extending south approximately to the Colorado-New Mexico line. It contains the headwaters of the Rio Grande. The San Luis Valley physiographically includes all of Alamosa, Conejos, Costilla, Mineral, Rio Grande, and Saguache counties, or roughly all of south central Colorado. Since Mineral County consists almost wholly of National Forest lands and contains only a negligible population, the San Luis Valley will here be used to mean Alamosa, Conejos, Costilla, Rio Grande, and Saguache counties.

Relative to other sections of the Rio Grande watershed, settlement and agricultural use of lands in the San Luis Valley is recent. The first settlements were made around 1850 principally by Spanish-Americans moving north from New Mexico and settling along the waterways of the valley.

The greater part of the valley remained uncultivated until about 1885. The first condition of rapid colonization was fulfilled in 1881 when the Denver and Rio Grande railroad was extended to Del Norte and a branch constructed southward to Antonito. The second condition was not met until about 1895 when the first irrigation districts were formed. These

were known as the Del Norte Land & Canal Company and the Citizens Ditch and Land Company. Both of these districts were chartered and projected by local citizens who, finding themselves without the necessary capital to undertake the projects, sold their rights to what is described as a "syndicate of eastern capitalists".

With the development of irrigation, the first land and loan companies came into existence. Prior to the development of the irrigation systems these companies acquired large acreages of land by homestead and purchase so that the sale of land and the sale of water became joint and virtually inseparable enterprises.

The decade 1880 to 1890 was a period of investment in the Southwest and in Colorado particularly. Large amounts of capital were exported to Colorado in the expectancy of large returns. The major part of the investment in livestock was English and returned in 1884 a dividend of 20 per cent. But irrigation, as an opportunity for profitable enterprise, had already begun to represent a significant form of non-resident investment.

It is primarily to corporate capital that the San Luis Valley owes its agricultural development. The conquest of this particular frontier owed more to the land speculator than to the pioneer.

To what extent the present characteristics of the San Luis Valley may be attributed to the land speculation which was so prominent a part of its past is not clear. Certainly land speculation was not peculiar to the San Luis Valley. Nevertheless the history of land speculation has a limited usefulness in explaining the striking differences which are exhibited between the San Luis Valley and the geographically contiguous area of northern New Mexico.

The San Luis Valley contains about 650,000 acres of irrigated lands of which, according to the 1930 census, about 383,000 acres were harvested crop land. For this 383,000 acres of crop land, there were almost 4,000 farms representing an average amount of crop land harvested of about 100 acres per farm. The holdings range from less than 3 acres to 20,000 acres of crop land with the greatest concentrations around 160 and 320 acres of irrigated land.

These modal concentrations accurately reflect the circumstances under which the San Luis Valley was principally settled. The irrigation and land and loan companies dealt primarily in sections and regular fractions of sections. The acre was no more a customary unit of land measurement for the San Luis Valley than for the public domain. Water rights were not sold by the acre but by the quarter section. One share of water

was that amount of water which would provide $2\frac{1}{2}$ acre feet of water annually for a quarter section. Land was originally sold by the quarter section, and was rarely divided into units of less than half that size. Whereas, in the neighboring area of north central New Mexico land tenure has been characterized by progressive subdivision of holdings and relative security in the lands held; in the San Luis Valley land tenure has been characterized by progressive accumulations of land and, for the whole population of the valley, relative insecurity of tenure.

Agricultural land in the San Luis Valley has been subject to large private investments in the form of mortgages. Add to this the speculative nature of farming in the San Luis Valley with its total dependence on wildly fluctuating prices and the result is not far to seek. In the major agricultural counties of the San Luis Valley, over 60 per cent of all agricultural land was sold for taxes in 1933 and 53 per cent of all farms operated by full owners in these same counties were mortgaged.

These figures are perhaps more indicative of what might have happened than what actually happened. Tax deals were made with the counties and only a small amount of the land that legally passed to the county actually passed out of the hands of the owners. Nevertheless, tax certificates are generally considered excellent speculations and under other circumstances

wholesale dispossession might easily have occurred.

Farming in the San Luis Valley is a highly commercial operation--the degree of commercialization being here measured by the amount of the investment in machinery and labor per acre of land. To support a high cost of production, credit must be available and a marketable crop must be grown. The crop which annually determines the prosperity or lack of prosperity of the San Luis Valley is potatoes.

In point of acreage only 38,000 acres, or 10 per cent of the total crop land harvested, was in potatoes in 1933. The value of potato production, however, was 54 per cent of the total value of all crops grown.

The acreage in forage crops, consisting principally in hay and field peas, amounts to approximately 70 per cent of all land harvested. The forage crops serve as rotation crops for potatoes and provide an important base for the livestock industry in the area. In terms of the money value of all crops grown in the area, hay crops amount to only 22 per cent of the total money value of all crops harvested. However, forage crops, although not productive of large cash returns, are not subject to the same degree of price fluctuation as potatoes; they provide a measure of stability in an otherwise unstable enterprise.

The price of potatoes is extremely variable, and, characteristically, the price which the producer receives for potatoes is subject to much wider fluctuations than his costs of production. At present, potatoes cost about \$60 an acre to grow. The price which the producer received for his potatoes has in the past fifteen years varied from 24 cents a bushel to \$4.50 a bushel. The average yield of potatoes has been, for the base period 1929-1933 inclusive, about 120 bushels per acre. On the assumption that this yield has been constant for the past 15 years of potato production, the average value of an acre in potatoes has varied from \$36 an acre to \$675 an acre, or nearly 2000 per cent.

Of the total cost of \$60 an acre for the production of potatoes, well over half is for the hire of labor. A little over 1100 potato farms reported hiring labor in 1929 with an average expenditure of \$844 per farm. Approximately half of all agricultural workers and operators were classed as farm laborers in 1929. This refers only to the resident population. In addition, there are large importations of labor from within and without the state when potatoes are ready for picking. Works Progress Administration projects close down during the picking season, and in 1936 three schools were closed in order to assure the potato producers an ample supply of labor. Potato picking over, the schools reopen and relief projects are resumed.

Annual costs of production represent only a portion of the costs involved in the production of potatoes. In addition, the average value of machinery and implements per potato farm is about \$1250 and represents a relatively fixed cost. The cost of water varies widely from irrigation district to irrigation district but under the district which supplies water to the major potato producing area the original cost of water was \$1800 for 160 acres. This cost has now been almost entirely liquidated. The operation and maintenance charges are at present insignificant--something less than 15 cents an acre.

With land selling at about \$100 an acre, the cost of owning a potato farm of 160 acres, equipping it and purchasing a water supply would be almost \$20,000, and if 100 acres of this farm were devoted to the production of potatoes the annual costs of operating it, exclusive of taxes, depreciation, or interest of any kind, would be in the neighborhood of \$6,000 annually. Farming in the San Luis Valley is not only a commercial operation but a commercial operation on a large scale.

All land in crops in the San Luis Valley is irrigated land. Of the 383,000 acres harvested in the San Luis Valley in 1929, 206,000 were classified as belonging in crop speciality or potato farms. But of this 206,000 acres in crop specialty farms only 38,000 acres were in potatoes. By far the greatest amount

of land harvested was given over to the production of hay. About 70 per cent of all land harvested was in forage crops.

There are two major reasons for this concentration of land in forage crops. The first of these is that the fairly extensive livestock industry in the San Luis Valley lacks range for winter grazing and depends to a considerable extent on feed lots for forage in winter. The second is that the production of potatoes requires a constant rotation of crops and that the soil building forage crops provide an opportunity to fertilize, at little cost, and represent a source of income from the grazing of sheep and cattle.

There are, in the San Luis Valley, 510 farms listed as stock ranches. The livestock population includes about 230,000 sheep and about 50,000 cattle. Of these totals, about 65,000 sheep and about 8,000 cattle were fed in the valley. The three National Forests which provide an important part of the range for stock of the San Luis Valley accommodate about 170,000 of the 230,000 sheep for a period of three months, and about 25,000 of the 50,000 cattle for a period of five months. There are approximately 2,470,000 acres of grazing land other than the National Forests which provide range for the balance of the stock. This means roughly that these 2,470,000 acres of grazing land must supply 977,000 cow months of forage. Converting these

cow months into cattle units yearlong, it appears that the grazing lands of the San Luis Valley carry the equivalent of 81,000 cattle yearlong or about 21 cattle to the section. This figure is undoubtedly somewhat higher than the actual number of stock grazing on lands in the area due to the fact that some irrigated lands are used for pasture. There are approximately 260,000 acres of irrigated land which are customarily not harvested. This land, given over to the production of natural hay, would somewhat reduce the estimate of 21 cattle yearlong to the section.

The total human population of the valley is 40,387 persons of whom 18,163 or less than half are classified by the U. S. Census as rural farm persons. This, however, is a classification as to residence rather than as to occupation. The number of persons classified as rural farm bears no necessary relationship to the number of persons directly dependent upon agriculture for livelihood.

There were, in 1929, 7,212 persons of the total population of 40,387 who were classified as gainfully employed in agriculture. The number of persons dependent upon these 7,212 persons employed in agriculture is not precisely determinable. A rough estimate would place the number of persons directly dependent upon agriculture at 65 per cent of the total population of the valley.

Of those persons directly dependent upon agriculture, about half are farm laborers and their dependents and the other half are owners and tenants and their dependents. The number of paid farm laborers was given by the 1930 Census as 3,350 which, with their families, would represent about 25 per cent of the total population of the valley. Another 25 per cent would be represented by owners and their families. Tenants contribute an additional 15 per cent to the population. Sixty-five per cent of the population, then, is directly dependent upon agriculture and the remaining thirty-five per cent are dependent upon agriculture in a manner which, while not direct, is scarcely remote.

From the years 1920 to 1930, there was a net increase in the number of farms. In 1920 there were 2,594 farms, while in 1930 there were 3,933 farms. While the total number of farms increased approximately 50 per cent, the number of farms operated by owners, part owners, or managers increased only 39 per cent, while those operated by tenants increased 89 per cent. However, tenancy is not yet the statistically predominant form of tenure. Only about 30 per cent of all farm operators in the San Luis Valley are tenants. Within the category of tenancy, the prevailing practice is sharecropping. Seventy per cent of all tenants are sharecroppers.

The characteristic association of tenancy with highly commercial agriculture is clearly evident in the San Luis Valley. Tenancy increased as both a consequence and a means of the commercial development of the area. The highest rates of tenancy are associated with the most highly commercial crops. Truck farms and potato farms show a percentage of tenancy well above the average per cent of tenancy for the valley as a whole.

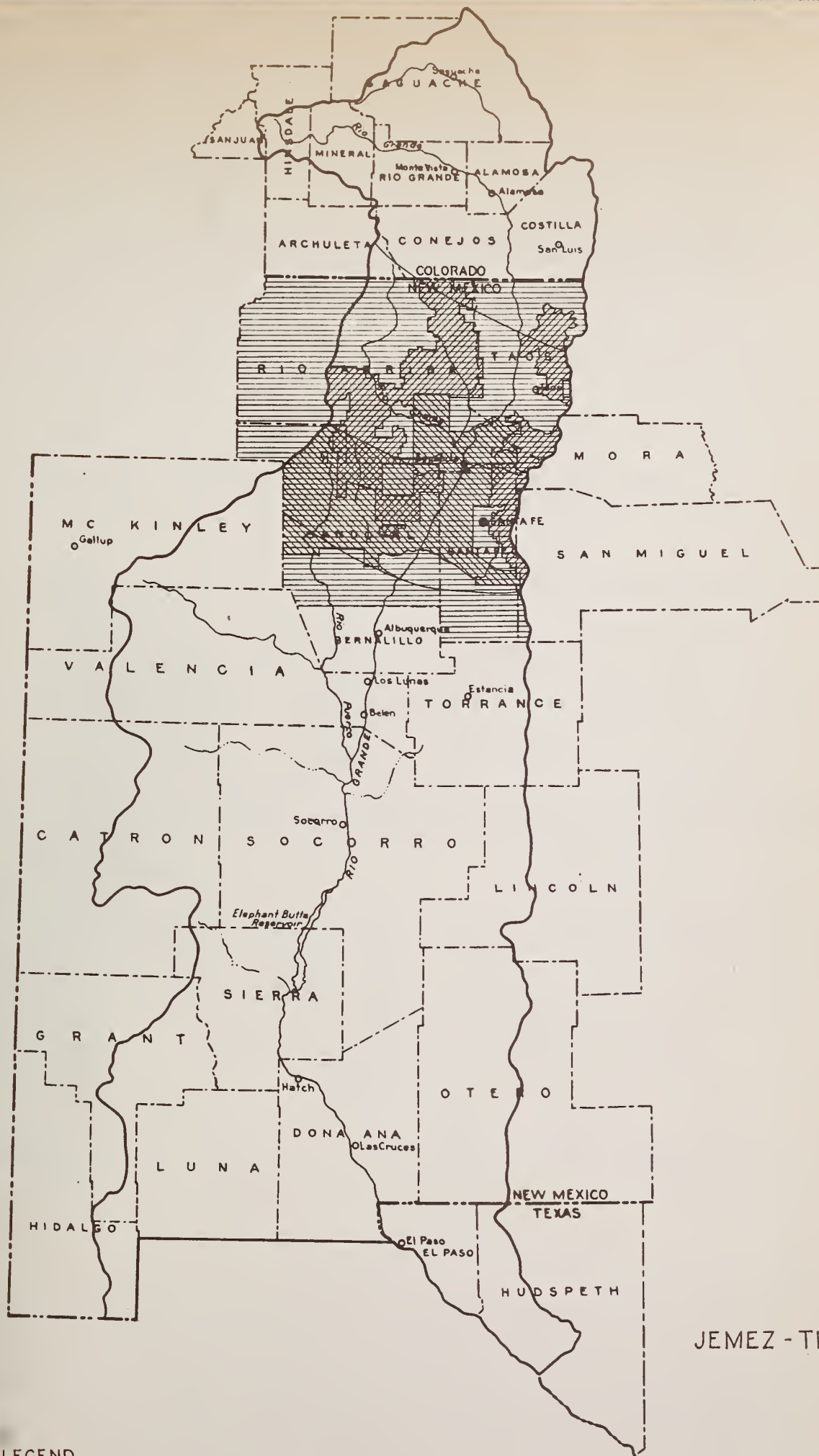
An area of commercial crop production inevitably attracts a large group of farm laborers. Thirty-three hundred and fifty persons and their families have settled in the San Luis Valley with no other independent resource than the ability to sell their labor as farm hands. This number is considerably swelled by transient labor when potatoes are harvested. However, the plentiful supply of labor which is so essential a community asset at harvest time becomes a community liability shortly afterwards. The relief population of the San Luis Valley is principally composed of those farm laborers after the potato harvest and until the preparation of the fields begins in late spring. The farm laborers of the San Luis Valley represent in part a permanent relief class from which the farmers can recruit labor when required. They represent a group which, occupationally, are dependent upon agriculture for a livelihood, but a group which agriculture does not support.

The San Luis Valley is similar to many other agricultural areas in the United States. Those associations of characteristics which best describe commercial irrigation farming in the United States are equally descriptive of the San Luis Valley. Its farms are large, its costs of production high. It is heavily mortgaged and insecure as to tenure. The investment in machinery is heavy and the expenditure for labor is high. Taxes are habitually delinquent. Farmers necessarily speculate in both land and markets. The most important relationship in the life of the area is the annual relationship of the crop to the market price. Farm operators are neither exclusively owners nor exclusively tenants. The owners of land and livestock are subject to much the same circumstances as the small entrepreneur anywhere. They operate at a profit one year and a deficit the next. The business cycle collects its annual tribute in dispossession and business failure. Some part of the San Luis Valley is bought every year and some part is sold. The occupants and users of the agricultural land of the valley are only the changing personnel which contribute human interest to an otherwise unchanging process.




The following sources were consulted:

U. S. Census - 1930
U. S. Census - 1935
Colorado Year Book - 1933-34
Resettlement Administration
Agricultural Extension Service
Office of the State Engineer
State Land Office
Rio Grande Canal Co.
Colorado State College

Jemez-Tewa Unit



JEMEZ - TEWA UNIT

- LEGEND
-  U.S. Census Data
 -  S.C.S. Dependency Survey
 -  U.S. Forest Service Data

UNITED STATES
DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
RIO GRANDE WATERSHED
1937

That part of the Rio Grande watershed lying north of Bernalillo and extending through the central part of the state of New Mexico north to the Colorado line is one of the oldest areas of agricultural use in the United States. Its lands have been continuously occupied and used for several centuries.

The population of this area is predominantly Spanish-American with a settled residence extending over three hundred years. Total rural population of the area, other than Indian, is approximately 38,000. Relative to the resources, the population is dense and lives primarily from the small pockets of fertile irrigated lands along the waterways and the surrounding range lands.

This area is likewise an area of Indian population concentration. Fourteen Indian pueblos with a population of 5,000 are dependent upon limited resources in land and water.

Centuries of use have exempted the Spanish-American and Indian population from the usual influences which have helped determine the development of agriculture in other portions of the United States. Its settlement was virtually complete long before the public land laws were passed under which most of America was settled. Characteristically, land has not been a negotiable commodity. Although no precise data are available on the rate of land transfer, there is some basis for the belief

that the turnover in land has been comparatively slight. Occupancy has passed from parent to child rather than from mortgagee to mortgagor or from seller to purchaser. To a greater extent than most, this area and its people have been insulated from commercial competition with its consequences of bankruptcy, dispossession, and the necessity of sharing earnings with invested capital in the form of interest on loans and mortgages.

The agricultural use of land in this area is predominantly non-commercial. In almost every cultivated land-holding, however, a fractional part of the acreage is devoted to an intensive cash crop, such as chili or fruit. The native farmer in this area has definite and pressing cash needs. As a rough estimate he and the group⁽¹⁾ dependent upon him require \$250 annually for clothing, additional food, and household and farm implements. He has only four possible means of obtaining it: (a) the sale of a cash crop, (b) the sale of livestock products, (c) the sale of surplus labor, (d) or the receipt of relief. All four of these means of obtaining cash are highly characteristic of the area.

The Indian population, although generally within the meaning of these statements, is subject to rather special conditions

(1) The use of the term "group" for purposes of this presentation refers to the consumption group, i.e., a group of people who habitually fund and share all forms of income. The consumption group is larger by almost a full person than the family. Unless otherwise specified, the terms "family" or "group" will be used to mean consumption group.

which will be developed later.

The Spanish-American farmer owns an average of 6.6
(1)
acres of irrigated land. Assuming the applicability of
gross area figures to any individual case, the major part of
this land is devoted to the non-commercial production of wheat,
corn, and garden crops. In addition to these, chili or alfalfa
is grown for sale. Two acres are in the production of cash
crops, and return a gross cash income of approximately \$75
annually which falls far short of supplying the necessary cash
income.

The second means available to the Spanish-American, the
sale of livestock products, does not provide a widely distri-
buted cash income. Livestock ownership for the majority of
the Spanish-American farmers of this area consists primarily
of the ownership of domestic livestock. In this respect the
fact that 1200 consumption groups, representing about 60 per
cent of the population covered by surveys, own the equivalent
of 2 cows or horses, or less, is conclusive indication of
the nature of livestock ownership. Of these 1200 groups 653 are
totally without livestock. Nevertheless, there are 815, or almost

(1) From the Human Dependency Survey, covering approximately
2,000 consumption groups or 9,000 people in the area in
question.

(2) One cow or horse is here considered to be equivalent to
four sheep or goats.

40 per cent, of the total number of consumption groups studied owning more than two horses, or their equivalent. For the most part, the need for draught animals does not exceed two horses; and the presence of 40 per cent of all cases owning more than draught stock indicates that livestock are a source of income to a significant number of persons.

Dependency on range lands is, relative to the available range resource, very great. The interrelationship between physiographic factors and economic factors is nowhere clearer than here. Normal processes of accumulation, although not as evident here as elsewhere, are by no means lacking. Of an agricultural population of 2015 consumption groups, 498 are without any cultivable land and 65 per cent of the population owns less than 5 acres of land per group. With land holdings of this size, the possibility of producing feed for farm animals is slight. Farm animals are turned in upon the stubble after the fields are harvested, and for the rest of the year find what little sustenance they can on the public lands and community-owned grants surrounding the villages. In many localities within this area the range forage available is not sufficient for the requirements of domestic stock, and minimum essential use constitutes serious overuse. The process is progressive and unrelenting. As the requirements

for minimum livelihood force the destructive use of the range, the depletion of vegetative cover on the surrounding range lands results in increased destruction of agricultural lands, forcing even greater dependence on even more depleted range. Some place within the outer boundaries of this circle is the farmer fighting an increasingly uneven battle for independent livelihood.

Generally speaking, no range lands other than the virtually destroyed public domain and community owned grants are available to the large majority of the population for use.

Under prevailing conditions only a minor portion of the available range resource in the National Forests is used by the small stock owners. In the Santa Fe National Forest 25 per cent of the total carrying capacity is used by 4 per cent of the permittees. Sixty-three per cent of permittees use an equal amount. In the Carson National Forest 4.8 per cent of the users are allowed 25 per cent of the carrying capacity, while an additional 25 per cent is used by 13 times that number.

So far as privately owned range lands are concerned, they are with few exceptions in highly concentrated ownership. It is, as a matter of fact, primarily because of the concentration of ownership of range lands that a characteristic type of organization of the livestock industry developed.

(1)

Tenant herding. while not peculiar to this area, is highly characteristic of it. It is at least a hundred years old and has persisted in essentially unchanged form down to the present. Under this arrangement a tenant herder, usually the owner of a small herd of sheep, agrees to rent a specified number of sheep from an owner who owns or controls the use of range land. By means of this agreement, the sharecropper is able to lease the use of the grazing land which he requires for his own sheep, and which was otherwise not available to him.

The tenant in renting sheep agrees to bear the total cost of operation. Even though the range on which the rented sheep are grazed belongs to the owner of these sheep, the renter pays a grazing fee for all sheep irrespective of ownership. The renter agrees to return upon demand a herd of the same size and age as that rented and pay an annual rental of twenty lambs for every hundred ewes in the herd. As cheap and as plentiful as herders are in this area, it is still cheaper to run sheep on a share-crop basis. It is not possible to say how extensive this practice is. However, the fact that the two largest sheep owners in the area employ it extensively may give some indication of its quantitative importance.

The third course that the Spanish-American pursues in order to realize the cash income necessary is the sale of his

labor. The only marketable surplus permanently obtaining among the native Spanish population is a surplus of labor.

Since about 1875 it has been the custom of a large majority of Spanish-Americans to supplement the earnings from their farms with the cash income which each family could earn through the labor of at least one of its members in the major labor markets of the Southwest. The increased dependence of the Spanish-American population on labor is roughly coincident with the opening of the Southwest for commercial exploitation. The building of the Denver and Rio Grande railroad represented, for a considerable period, the major employment opportunity. Mining, which gained impetus with the development of transportation facilities, offered additional possibilities. The development of a large area of potato and truck farming in the San Luis Valley and the growth of sugar beet farming and sheep raising sharply increased the demand for cheap labor. The resident Spanish population provided the major supply.

A plentiful supply of cheap labor in periods of prosperity and expanding business activity is for the employers of labor an asset. In periods of depression it is otherwise regarded. Beginning in 1930 the market for labor began to contract. Seasonal laborers were declared to be vagrants. The cost of relief mounted and state lines tended to define

the distance a man could travel in his search for employment. Colorado and California patrolled their borders. The Spanish-American laborer from New Mexico returned to the farm which had during his absence grown no more sufficient to meet his requirements of livelihood.

The final alternative is relief. A fifteen per cent sample of the Spanish-American population of the area showed 45 per cent of the sample population to have received some form of relief during 1935. In the Indian population the percentage is much higher. At present 45 per cent of the Spanish-American population is meeting its cash requirements in the only possible way--government relief.

An area with a low cash income will export rather than import labor. The four counties principally involved in this area, Rio Arriba, Sandoval, Santa Fe, and Taos Counties, have a significantly small expenditure for farm labor and a significantly small number of farms reporting the employment of any farm labor for 1929.

For these four counties, only 32 per cent of all farms hired any labor. The average expenditure per farm for labor in 1930 was only \$60. On the other hand, the average income from non-relief wage work in the sample covered in this area was \$135 per group.

An area with a low cash income must maintain the costs of production at the lowest possible level. Where only a surplus of labor exists the primary dependence will be upon non-mechanical labor. The average value of machinery per farm in these counties, including automobiles for whatever purpose they are used, does not exceed \$200.

It is by no means fortuitous that less than 5 per cent of the farms are mortgaged and that the average mortgage indebtedness for land and improvements on those farms which are fully owned and mortgaged is under \$5 an acre on irrigated lands. In those agricultural activities which are well insulated from the price system, the Spanish-American farmer continues to enjoy unchanging income from a bushel of corn and a bushel of wheat, and neither speculates in land nor in prices for farm produce.

To the native farmer, land is a permanent possession with a value which changes only as the productive value of that land changes. Therein lies not only his security, but his basic uncertainty. Due to the fact that by and large the native farmer is overdependent on his resource in range, due to the fact that he must for bare livelihood use it beyond its capacity to sustain use, the resource in range is dwindling. The range resource is not only dwindling in productivity but also it is losing its capacity to hold soil

and moisture. The result is a destruction of the irrigated lands along the permanent streams.

So far we have been in the main concerned with the Spanish-American population. To a considerable extent no revisions need to be made in what has been said to extend its application to the Indian population. Yet there are certain characteristic relationships between Spanish-American and Indian which require the differentiation of the two groups.

To the small extent that share-cropping and renting of land occurs between the two groups, the Indian is the landlord and the Spanish-American the tenant. To the extent that the employment of labor constitutes an intergroup relationship, the Indian is the employer and the Spanish-American the worker.

The major causative factors appear to be two. The first and perhaps most significant of these is cash income from wages or some form of government relief. Ninety-two per cent of the Indian population covered in the sample study had some income from wages or relief in 1935, while only 69 per cent of the Spanish-American population had some income from these sources. Further, the major concentration of the Spanish-American population, 50 per cent of the total Spanish-American population, received less than \$100 during the year 1935 while only 20 per cent of the Indian population received less than this amount. There has been an observed relationship

between the amount of wage work available to Indians and the number of Spanish-American tenants and laborers these Indians employ. Concretely, with the going rate for Spanish-American farm labor at \$1 a day, there is a noticeable tendency for Spanish-American tenants and laborers to farm Indian land while the Indian owner is otherwise employed at a wage rate slightly over \$2 a day which is the going rate for Indian Emergency Conservation work.

The second major cause of the apparently more favorable economic position of the Indian group in its relations with the Spanish-American group lies in the distribution of resources. Although both modal and average expressions of ownership of resources do not markedly differ between the Spanish-American and Indian groups, the total range of resources is not equally similar. The spread in the ownership range of resources is considerably greater in the instance of Spanish-American ownership than is the instance of Indian ownership. In general, a considerably greater proportion of the Spanish-American population falls into the lower classes of ownership, and specifically in the class of non-ownership. The existence of a large group of persons with an entirely inadequate share of income will tend to provide a constant supply of tenant farmers and hired labor. With the opportunities for government work which now obtain, the Indian landowner is in a position to take advantage

of this supply.

Nevertheless, measured by either relative or absolute standards, both the Indian and the Spanish-American in this area belong to a low income group. The Indian, although at present in the more favorable position of the two, is by no means living well. That the Spanish-American population is living less well or less securely is of comparatively slight import. The distinction in income level obtaining between the two groups is not sufficiently great to require separate consideration for each.

Various diagnoses of the situation have been offered along with suggested remedies. These have ranged from agricultural credit to the inevitable proposals for education. Here no remedy is offered but only a prediction. In the absence of security and a continuously satisfactory level of livelihood, neither agricultural credit nor education will accomplish the end of conservative land use. Destructive use of resources will continue with or without education or agricultural credit; demonstration or crop loans.

Destructive use of resources here occurs not because of lack of knowledge, though lack of knowledge exists, nor lack of credit, though credit is lacking; but because of the lack of facilities to do otherwise. Overdependence means

overuse, and insofar as the effect is related to the cause, the problem can be met only by intrinsic measures.

Variously administered as public responsibilities in this area are National Forests, Public Domain and submarginal purchase areas. Upon all of these lands the Spanish-American population is dependent. The measure of their actual dependency is not the measure of their need. Although the means of meeting these needs may not be available under any possible redistribution of the use of these lands, any steps toward alleviating the severe condition of overdependency upon resources which now obtains must wait upon the willingness and capacity of the federal agencies concerned to join in the common consideration of a problem which belongs to them not singly but collectively.

Middle Rio Grande Unit

The area under consideration in this report is the area contained within the Middle Rio Grande Conservancy District, the narrow strip of cultivable land of the Middle Rio Grande Valley extending from the southern end of Sandoval County through Bernalillo, Valencia, and Socorro Counties to the upper end of Elephant Butte Lake. This strip contains the bulk of the irrigated, cultivated land within Bernalillo, Valencia, and Socorro counties, so that data for these counties cited from the United States Census Reports is applicable with small error to the area here under consideration.

The City of Albuquerque is the only important urban center within the Middle Valley, with a population of about 35,000. Four smaller towns, Bernalillo (in Sandoval County), Los Lunas and Belen (in Valencia County), and Socorro (in Socorro County), with a total population of about 6,000, are the only other towns of any importance in the area. Though not actively engaged in agriculture, the majority of the population of these smaller towns and of the City of Albuquerque is dependent upon the agricultural area surrounding it. The classification of the population of the three counties as to rural or urban in the last census shows the rural population as more than 60 per cent of the total.

The total population for the three counties, 1930 census, was 71,243, the bulk of whom reside in the area along the river.

The ethnic character of this population is largely obscured in the census reports: under "white" population are included Mexican; under "colored" population are included Negroes, Indians, and other non-whites. Roughly, however, the Indian population is about 3,000, the remainder almost wholly Anglo-American and Spanish-American with only a few dozen Chinese, Japanese, and others appearing in the census returns.

The proportion of Anglo-American to Spanish-American is not closely ascertainable at the present time. In many sections of the valley, particularly in the more isolated agricultural areas, the Spanish-Americans outnumber the Anglo-Americans twenty to one. The estimate given in the Middle Rio Grande Conservancy District Economic Survey of May, 1936, is 40 per cent Anglo-American and 60 per cent Spanish-American for the district. Estimates published by the State Planning Board, based largely upon the school censuses of 1932, 1933, and 1934, place the Spanish-American population as 80 per cent of the total rural population of Bernalillo County, 81 per cent of the total population of Socorro County, and 75% of that of Valencia County. On this basis, the Spanish-Americans constitute between 75 and 80 per cent of the total rural population of the three counties, the area here under consideration.

The historic occupation and use of the area have been

Indian, Spanish, and Anglo-American. All three groups are importantly represented in the area today. The Spanish occupation, reflected in the present preponderance of Spanish-Americans, dates from the sixteenth century, antedating the Anglo-American occupation by some 300 years. Mediterranean blood and culture of the 16th & 19th centuries combined with the blood and culture of the Mexican and southwestern Indians to produce a hybrid group which over several generations worked out a fairly self-sufficing agricultural adjustment in the Rio Grande Valley. Anglo-American immigrants into the area in the late 19th and early 20th centuries found them foreign in race and culture and regarded them as a group apart, an attitude that still prevails. Content to remain apart and able through the secure possession of small tracts of irrigated land to maintain themselves on a relatively comfortable subsistence level, no serious dislocations occurred in the lives of the Spanish-Americans during the early years of Anglo-American occupation. Contacts were either relatively few or, as in the case of work on the railroad, impersonal and non-competitive. More recently, however, this relative isolation and security has been threatened. With the establishment of the Conservancy District in 1928, much of the rural population was rather precipitously injected into a commercial situation demanding a new

type of adjustment in the use of irrigated land, a type which would be productive of high cash returns to meet new cash costs. The efforts of many of the local Spanish-American land-owners to block the organization of the Conservancy District are testimony to the fact that they were not unaware of the dangers inherent in the imposition of cash costs and liens on their hitherto unencumbered land.

The character of the present use of land in the Middle Rio Grande Valley is indicated by data from the United States Census. Comparison of data from the 1930 and 1935 Censuses is partially revealing of the effect of the institution of the Middle Rio Grande Conservancy District.

The number of farm operators in the three counties, by tenure, for the years 1925, 1930, and 1935 are shown in Table (1)

I. The figures there presented show no appreciable change in number of farm operators from 1925 to 1930, but a considerable increase (37.5 per cent) during the period 1930-1935, 50 per cent of which occurred in Valencia County. The period from 1930 to 1935 coincides with the carrying through of the Middle Rio Grande Conservancy project which probably accounts for the increased farm activity during the period. Inasmuch as fifty or sixty thousand acres of potentially good

(1) All tables are appended.

agricultural land were out of use due to waterlogging, prior to the completion of the Conservancy program, it is not surprising to find a marked increase in the number of farm operators. The amount of land that has been brought into use since the Conservancy District began operations is not known exactly; the engineer's estimate is that only 5,000 additional acres were being cultivated in 1935 that were out of use in 1930, (1) nearly half of which reclaimed land was in Valencia County.

The increased farm operation is reflected both in owned lands and lands operated by tenants, with a slightly greater increase in tenancy. The proportion of tenants while it increased slightly from 1930 to 1935 is still low as compared with most areas of commercial agriculture; therefore, the area is a fairly stable one from the standpoint of farm-owner population. On January 1, 1935, 45 per cent of the owners of land had been on their farms over 15 years. Only 11 per cent had been on their farms for 1 year or less. In contrast to these figures for owners, 50 per cent of the tenants were on their present farms for 1 year or less. Bernalillo County shows the highest percentage of tenants of short residence.

(1) Letter of Stanley Phillippi, Assistant Engineer, dated Dec. 27, 1935, to Tom Reid, Extension Agronomist, N.M. Agricultural Extension Service.

Of a total of 21,593 persons reported on farms in the area January 1, 1935, 21.7 per cent were persons whose residence was non-farm five years earlier. This is indicative of a greater movement from non-farm to farm residence in the Middle Rio Grande Valley than took place in the state as a whole, where the percentage of such persons is but 13. Socorro County shows the highest percentage increase (30 per cent). It was only in Socorro County that any great amount of previously unused land was brought into use by the Conservancy program and it is only in this county that there has been any appreciable influx of new settlers, estimated by Conservancy District officials as a 40 per cent increase.

The total number of farms in the three counties, exclusive of stock ranches which fall for the most part outside the area here under consideration, in 1934 was 4900 containing a total of 1,192,402 acres. While these figures indicate that the average farm is about 88 acres, 47% of all farms contain less than 10 acres.

The relative importance of various types of farms, by number of farms, amount of acreage, and average acreage, is shown in the following array:

Relative Importance of Various Types of
Farms, Middle Rio Grande Valley, 1935 (1)

By Number of Farms		By Total Acreage		By Aver. Acreage	
(1) Crop specialty	776	(1) Stock ranches	1,373,659	A. (1) Stock ranches	2792
(2) Abn. & Unc.	679	(2) Crop specialty	135,604	(2) Crop Spec.	175
(3) Stock ranches	492	(3) Abn. & Unc.	53,525	(3) Truck	153
(4) Self-sufficing	420	(4) Self-sufficing	17,907	(4) Dairy	110
(5) General farms	391	(5) Cash grain	16,223	(5) Abn. & Unc.	79
(6) Truck farms	243	(6) General farms	15,429	(6) Cash grain	75
(7) Cash grain	229	(7) Dairy farms	7,078	(7) Animal Spec.	60
(8) Fruit farms	65	(8) Truck farms	3,712	(8) Self-sufficing	43
(9) Dairy farms	64	(9) Animal Spec.	2,787	(9) General farms	39
(10) Animal spec.	46	(10) Fruit farms	2,079	(10) Fruit farms	32
(11) Poultry	30	(11) Poultry	501	(11) Poultry farms	16
(12) Cotton	0	(12) Cotton	0	(12) Cotton	0

Excluding stock ranches, the acreage devoted to crop specialty farms (those on which 60 per cent or more of the acreage is devoted to field crops) is about 12.5 per cent more than the acreage devoted to all other types of farming. This type of farm surpasses all others in number and, except for stock ranches, also has the largest average acreage per farm. Self-sufficing farms rank fourth both in number and in acreage.

The total farm land in the area, including all types of pasture land, is classified by use in Table II. The amount of land available for crops (including plowable pasture) increased from 1929 to 1934 by 80 per cent (77,000 acres), due principally (2) to the land rehabilitation program of the Conservancy project.

(1) Agric. Census, 1935, Bernalillo, Valencia, Socorro Counties.

(2) The state increase for the same period was 38 per cent.

The crop land harvested, however, during the same period decreased by 30 per cent (13,046 acres)⁽¹⁾. This decrease is largely accounted for by the drought-caused crop failure of 1934 when a total of 50,000 acres failed as against 4,669 acres in 1929.

The amount of land in actual cultivation (harvested and failed) for 1929 and 1934 shows an increase of 32,000 acres for 1934, about 68 per cent. Accordingly, though the amount of land available for crops increased 80 per cent (77,000 acres) less than half of the land rehabilitated for use was actually put to use.⁽²⁾ This is in agreement with information furnished by the Conservancy District officials who attribute most of their present financial troubles to the failure of farm operators to make use of lands now available to them for cultivation and on which annual assessments are levied whether the land is being cultivated or not. The real reason for this failure to bring into production potentially useful land is worthy of more study. It is commonly ascribed to non-desire or innate inability on the part of the Spanish-American population to improve its condition; the Finance Committee of the Middle Rio Grande Survey in 1935 attributes the failure largely to lack

(1) The decrease in the state was slightly more than 100 per cent.

(2) This same condition is approximated in the state as a whole: between 1930 and 1935, the amount of land available for crops increased by some 700,000 acres yet 1934 shows only 375,000 more acres actually planted than in 1929.

of sufficient funds to carry on necessary leveling, clearing, and planting operations, one of the stock excuses for defaulting irrigation enterprises the country over.

The crop land harvested in 1929 amounted to 43,000 acres; 12,000 acres were idle and 5,000 acres failed. Half as much crop land was idle or failed as was harvested in what is considered a normal year. This points to an ineffectual use of the land. Socorro County was the worst sufferer, where 8,300 acres were idle or failed against 9,000 harvested; Valencia County was next where 5,000 acres failed or were idle against 16,000 harvested; and Bernalillo was next where 18,000 acres were harvested against 3,000 failed or idle. For reasons not yet clear, the farmers in Bernalillo County (where urban influence is greatest) appear to make more thorough use of their lands than do the farmers of Socorro and Valencia.

The total value of all crops harvested from the 43,000 acres in 1929 was, for the area, \$1,484,030, divided as follows:

Value of All Crops Harvested, 1929, Bernalillo, Socorro, Valencia Counties, New Mexico (1)

	Bernalillo	Socorro	Valencia	Total
Total	\$767,792	\$244,720	\$471,518	\$1,484,030
Cereals	65,822	42,034	130,844	238,700
Other grains & seeds	161,385	128,588	38,999	328,972
Hay & forage	215,150	47,361	154,132	416,643
Vegetables (including all potatoes)	150,187	4,611	56,994	211,792
Fruits & nuts	98,824	16,564	48,087	163,475
All other field crops	2,750	341	1,220	4,310
Farm veg. for home use	73,674	5,221	41,242	120,137
Nursery products	11,850	-	150	12,000
Forest prod. cut on farm	9,810	8,637	6,414	24,961

(1) U. S. Agricultural Census, 1930.

The principal cash crop in the area is alfalfa which, in 1929, was worth nearly \$250,000, about 16 per cent of the total value of all crops. Cash cropping, it can be seen from this one figure, is not particularly important in the area. The average yield per acre in 1929 was 2.6 tons; in 1934, 2.25 tons. The per acre yield of different varieties of alfalfa raised on the New Mexico Agricultural College Experimental farm from 1921 to 1930 ranged from 6.17 to 4.17 tons, indicating that the per acre yield in the Middle Valley can probably be increased, even doubled, with better selection of seed and improved, if also more costly, methods of cultivation. On the basis of questionnaires returned by 19 farmers in Bernalillo County in 1935 to the Hay and Grain Committee of the Conservancy District Economic Survey, 10 of the 19 reported their intention of increasing their alfalfa acreage. The Committee's final report recommends an increase in acreage from the present 11,000 acres to a total acreage not to exceed 50 per cent of the crop lands, but recommends further the use of this increased hay crop for local feeding of livestock--both dairy and feeder stock--and not for export shipment. The Committee deems it inadvisable to attempt to compete in markets now supplied with alfalfa by the Pecos and Mesilla Valleys.

The growing of small grains in the area has always held an important place both for feeding livestock and for home

consumption. The acreage devoted to these in 1929 in the three counties was slightly over 7,000. Corn, for all purposes, feed, silage, etc., required 11,000 acres, the same amount as alfalfa. Since increased feeding with alfalfa will bring about an increase in the use of other feedstuffs, it is expected that an increase in acreage of small grains will result. The average per acre cost of producing corn is estimated by Walker and Cockerill⁽¹⁾ to be \$26.35, \$27.67, and \$28.92, based upon yields of 29, 40, and 50 bushels per acre respectively. In 1929, however, according to the Census figures, the average yield for the Middle Valley⁽²⁾ was only 15 bushels per acre. Despite this discrepancy between fact and supposition the Small Grains Committee of the Conservancy District Survey considers corn the most desirable cash grain crop, the principal market to be within the district and immediately adjacent areas, and to be marketed as feed for livestock in the region.

The other large acreage crops in the region are hay crops of various kinds, hay sorghums for forage, timothy, clovers, etc., to which in the three counties 12,465 acres in 1929 were devoted. The larger part of this (10,438 acres)

(1) Bulletin 215, New Mex. College of Agric. & Mechanical Arts.

(2) In 1934 the per acre yield was considerably less due to the drought.

was in hay sorghums for forage.

Beans were grown on 12,000 acres reported by 638 farms. Though all this is irrigated acreage, the 1929 figures show only a slightly higher yield (about 625 pounds per acre) than the yield obtained by dry farming methods in Torrance County (1) (about 580 pounds per acre). Beans would appear not to be a profitable commercial crop in competition with the dry-farmed Estancia Valley unless the per acre yields can be greatly increased. The present acreage does not, however, supply local needs, and some increased acreage may be expected; the exact increase needed to fill the demands of local consumption can not be inferred from the data available.

The balance of the acreage in the area is devoted to fruits and vegetables for home use and for sale. In 1929, 1143 farms reported 1397 acres of land in orchards and vineyards, from which was realized \$163,475, an average income per acre of \$117, and per farm of \$144. Questionnaires sent to 26 farms in the three counties in 1934 revealed that fruit farming is not a highly specialized activity. In Socorro County on 3 farms reporting 2.5 average acreage in fruit, the average total farm acreage was 112; in Valencia County on 11

(1) U. S. Census Reports, 1930.

farms reporting 4.7 average acres in fruit, the average total farm acreage was 40; and in Bernalillo County on 12 farms reporting an average of 17.6 acres in fruit, the average total farm acreage was 53.2.

Vegetables raised for sale were reported for 992 acres by 179¹/₄ farms, having a total crop value of \$130,350, an average price per acre of \$130, per farm of \$72. Chili is not included in these figures. Questionnaires from vegetable farms indicate that vegetable farming, like fruit farming, is not highly specialized, all farms reporting a large percentage of their acreage devoted to products other than vegetables.

That neither the fruit nor vegetable production in the region is sufficient to satisfy the local market is indicated by the fact that in 1929, 466 carloads of these products were received in Albuquerque by the Santa Fe Railroad. Yet, even in competing for the local market, improvement must be made in acre yields, quality of product, grading, etc. The Middle Rio Grande Conservancy District Committee in 1936 recommended no increase in the acreage of asparagus, lettuce, sweet potatoes and root crops; other fruits and vegetables should be increased only to supply the local needs. Such an increase is not sufficient to place fruit and vegetable culture on a highly commercial basis; production to take care of the somewhat limited home market will make but a small increase in cash income for

the farmers in the area. Furthermore, adjustment to such specialized use of the land requires careful consideration of the markets available, transportation facilities, seasonal demands, soil productivity, use of fertilizers, increased yields, improvement and proper grading of products, and efficient marketing associations, none of which at the present time seems to have been given nothing more than the most cursory consideration.

Dairying and poultry raising are both practised to a limited extent in the region; but, except for raw milk, local needs are not supplied. It was estimated by the Conservancy District Committee on Dairying in 1935 that 3500 dairy cows would be required to produce those milk products now shipped into the area. Approximately 70 per cent of the eggs used in Bernalillo and Valencia Counties are from outside the state about double the percentage (38 per cent) imported by the state as a whole. Based on the average annual egg import for the years 1929-1931, 72,000 additional hens are needed to supply the deficiency in the area. Commercialization of the poultry and dairy business has to take into consideration cheaper feed than is now available, improved strains of dairy cows and egg-producing hens, market availability, and other farm activity.

The present non-commercial character of the Middle Rio Grande farm is further borne out by the fact that the expenditures

for labor, aside from family labor, are relatively low. For all farms reporting such labor in 1930 (1196) the expenditure amounted to \$362,771 for 193,742 days of labor, an average per farm of \$303 for 162 days of labor. The breakdown of the labor expenditures by type of farm, indicates that 40 per cent of the total expenditure for labor was made on 177 stock ranches, leaving a per farm average for all other types of farms of \$210. Nearly all of the stock ranch expenditure was reported from Socorro and Valencia counties. Bernalillo County, on the other hand, leads in truck and dairy farm expenditures for labor. This concentration of truck and dairy farms reflects the influence of the City of Albuquerque, and is significant from the standpoint of commercialization, since only in Bernalillo County is any widespread commercial farming indicated, stock ranches excepted. It is pertinent that of 68 truck farms reported in Valencia County only 12 of them (18 per cent) reported any expenditure for labor, and then only an average expenditure of about \$80, whereas of 172 truck farms in Bernalillo County 70 (40 per cent) reported an average expenditure of \$467. If the success of the Rio Grande Conservancy program depends upon more intensive and more commercial use of the land it is apparent that the most extensive changes must occur in Valencia and Socorro Counties. Irrigated lands of these two counties carry the same conservancy

charges per acre per type of land as does the land of Bernalillo County devoted more to commercial crops. The more commercial use of the land in the vicinity of Albuquerque is also reflected in the smaller amount of tax delinquency in Bernalillo County, figures for which are presented later.

The foregoing material does little more than give quantitative expression to facts of common knowledge that can be picked up in a short conversation with anyone who has some acquaintance with farming conditions in the Middle Valley. The land use is largely of a non-commercial, subsistence type, incapable at its present level of use of producing any considerable cash income. Recently this need for cash has been made more crucial by the formation of the Middle Rio Grande Conservancy District which not only has imposed on the land an additional cash burden but has made such cash in many instances prerequisite to retention of the land on which even a subsistence living can be made.

The Middle Rio Grande Conservancy District

Credit for the work of organizing and promoting the Middle Rio Grande Conservancy District is difficult to allocate specifically. The project seems to have been given its initial impetus about 1920 when, according to Mr. C. A. Anderson, present chief engineer of the District, who has been associated with the project since its organization in 1925, the Federal Land Bank of

Wichita refused, on the basis of the adverse report of its engineers, calling attention to the progressively seeped condition of the land, to make any more loans on land in the area. (1)

Certain public spirited citizens of the Valley, alarmed at the waterlogged condition of the land and its decreasing productivity, after much effort, obtained legislation which led to the financing and construction of the project.

Mr. C. H. Howell, chief engineer of the District at the time of its organization, in 1935 told members of the Albuquerque Rotarian Club that the project was determined by three conditions existing in the Middle Valley:

- 1) A waterlogged or seeped condition of about 85,000 acres of land formerly cultivated.
- 2) The danger of flood damage.
- 3) An obsolete and inefficient irrigation system.

The drainage problem seems to have been the one of most immediate concern in 1925, though Mr. Anderson in recent testimony given before Special Master Warren in the current Texas-New Mexico lawsuit, has stated that all three were considered equally pressing.

Mr. Howell, in recalling the history of the District,

(1) "Resources and Opportunities of the M. R. G. Valley
University of New Mexico Bulletin #264 (April 15, 1935)
p. 34.

related that in 1880, 125,000 acres of land in the Middle Valley were being farmed, but between that date and 1896 (16 years) about 65,000 acres were abandoned. This abandonment was due, says Mr. Howell, to a decreased water supply brought about by the enormous development in the San Luis Valley in Colorado, where, in the 1880s, several hundred thousand acres of land were put under irrigation by the Travellers Insurance Company and other large companies. (1) According to Mr. Howell, the decrease in water supply brought about by the Colorado development resulted not only in insufficient water for irrigation in the Middle Rio Grande Valley, but allowed also, because of reduction in regular stream flow, the gradual silting up of the river channel with consequent overflow, flood damage, and the waterlogging of adjacent land.

During 1926-27 reclamation service engineers classified the area as to water level, estimating that only about 2,000 acres in the entire Middle Valley were free from some damage by seepage. The total area in swamp grass, salt grass, alkali and dunes was approximately 50,000 acres. Reclamation Service

(1) Ibid., p. 12. Mr. Howell states further: "Plans are being made for further increase of the irrigated area in Colorado. This will result in further decreases of irrigation water in New Mexico." (p. 13).

engineers also advised that the water supply, as developed by the proposed Conservancy Plan, would be adequate for the irrigation of 140,000 acres.⁽¹⁾

As finally organized, the Conservancy District embraces bottom lands of the Rio Grande river from the lower end of White Rock Canyon (south of the San Felipe Indian Pueblo, shortly below the point where the river leaves Santa Fe County for Sandoval County) down to the upper limit of Elephant Butte Reservoir at San Marcial. These boundaries are fixed by law.⁽²⁾

The district was organized August 22, 1925, and the constitutionality and legality of the organization were upheld by the Supreme Court of New Mexico on December 12, 1925.⁽³⁾ The district is defined by law as a political subdivision of the State of New Mexico and a body corporate with all the powers of a municipal corporation, including the power, within certain limits, to assess taxes. The County Treasurers of Bernalillo, Sandoval, Socorro and Valencia counties are by law treasurers of the District, and district taxes and assessments are collected in the same manner, and with the same penalties for delinquency,

(1) Official Plan of the Conservancy District, p. 17.

(2) Session Laws of New Mexico, 1927, Chapter 45.

(3) House Document No. 141, 70th Congress: 1st Session, 1938, Middle Rio Grande Conservancy District, pp. 8-9.

as state and county property taxes. Property owned by the District is tax exempt.

The District is approximately 150 miles long and from 1 to 5 miles wide, having a gross acreage, including the river bed, of 182,845 acres. After deductions for river bed and various rights of way, the total area benefited by the Conservancy Plan is 123,397 acres, of which 19,615 acres are Indian lands, and 3,250 acres are included in city and town sites, leaving a net non-Indian agricultural area of 100,532 acres. (1)

(2)

For engineering purposes, the District is divided into Divisions which, with respective benefited acreages (as of 1928) and headquarters, are as follows (from north to south):

Division	Headquarters	Acreage		
		Including Indian Lands	Excluding Indian Lands	Excluding City & Town Sites
Cochiti	Bernalillo	10,396	1,412	1,412
Albuquerque	Albuquerque	37,808	33,332	30,482
Belen	Los Lunas	59,372	53,217	52,977
Socorro	Socorro	15,821	15,821	15,661
TOTALS		123,397	103,882	(1) 100,532

(1) Adjustments since 1928 have resulted in increasing this figure to 102,912,04 acres in 1936. (See Conservancy District statement of October 31, 1936). Of recent date it is reported that the Apache Grant in Socorro County (about 5,500 A.) is to be taken out of the District.

(2) Three division field engineers are employed, one each for Belen and Socorro divisions, a third one for the Cochiti-Albuquerque divisions combined.

For bookkeeping purposes and in order to facilitate the tax collection work which falls to the respective county treasurers, the District is set up in the Albuquerque offices along county lines. These, with acreages, excluding Indian lands, are as follows:
(1)

County	County Seat	Acreage, Excluding Indian Lands
Sandoval	Bernalillo	6,642.14
Bernalillo	Albuquerque	25,370.90
Valencia	Los Lunas	35,891.41
Socorro	Socorro	31,307.59
TOTAL		102,912.04

In order to finance the district, bonds in the amount of \$8,700,000 were issued. Bids for the purchase of all or any part of the issue were called for on May 18, 1929. The first deed was bought March 12, 1930.
(2) Construction work on the structural features of the project was begun in 1930, and at present writing is about 99 per cent complete. Final costs (including a small amount estimated to complete the project), from the current construction cost sheet of the District, indicate savings of about

(1) Figures from Conservancy District Statement of October 31, 1936.

(2) Bulletin 215, New Mexico Agricultural Experiment Station, Las Cruces, New Mexico

10 per cent (approximately \$1,000,000) over the original estimated construction costs.

The cost of the project was to be borne by the benefited lands and business enterprises within the district. To determine the amount each owner should be assessed, a board of appraisers, composed of local men, during 1926-27, surveyed and appraised all property and improvements in the District. All agricultural land was classified by types as shown in Table III.

Excluding Indian lands, about 45 per cent of the land was under cultivation; the balance, about 55,000 acres, was out of cultivation in 1928 because it was either uncleared, unleveled, improperly drained, or not under ditch. The object of the conservancy program, insofar as it applied to the agricultural lands, was to improve those lands already in use as well as to bring into cultivation the 55 per cent out of use. It should be noted here that these 55,000 acres to be rehabilitated were not represented by one or two or even a dozen large units, but were almost wholly the accumulated unusable acreages from several thousand small tracts owned and operated by small-farm operators. The program was carried on, not to attract new settlers, but to rehabilitate land already fully owned and but partially or ineffectively productive.

After the land was classified by type, each type was assigned an estimated benefit per acre, on the basis of which

the original assessments were made. Table IV lists the type of land, appraised benefits per acre, and original assessments.

The appraised benefits for each tract were the supposed additional value of that tract due to the execution of the Conservancy program. In general, those lands least productive at the time of the survey because of poor drainage, inadequate irrigation, danger of flooding, or other reason, were considered to be benefited the most, and hence were given higher appraised benefits than were the more productive lands.

The assessment in each case is 44 per cent of the appraised benefits. The assessment per acre ranges from \$20.00 to \$52.80 with an average of \$45.00. Such an assessment, with a 90 per cent collection, was thought sufficient to cover costs of construction. Table V shows the per acre average appraised benefits, assessment, capitalized interest, total principal, and average annual levies on the various types of non-Indian agricultural land.

All land assessed is presumably either now cultivated or is cultivable under the conservancy work. Hence payment of all annual levies must be made whether the land is actually cultivated or not. No charge for water is made as the enabling act makes no provision for this charge. An attempt made in 1935 to get the act amended to allow a charge of \$1.25 an acre for water

was unsuccessful.

The bonded indebtedness is to be paid off in 45 years (1) from 1929. The total levy in any one year for interest and principal on the bond issue, plus the maintenance levy, cannot be more than 7 per cent of the total assessment. The annual maintenance levy cannot, by law, exceed 1 per cent of the appraised benefit. Levies for the years 1934, 1935, and 1936 are as follows:

Year	Bond Levies (1)		Total	Maintenance Levy (2)
	Prin.	Interest		
1934	0.8%	4.2%	5	0.528%
1935	0.4%	4.0%	4.4%	0.8%
1936	0.75%	5.0%	5.75%	0.9%

(1) In percentage of total assessment.

(2) In percentage of total appraised benefits.

The 25 per cent increase in 1936, still within the legal 7 per cent limit, is a subject of complaint by property owners at the present time. Conservancy District officials state the increase is necessitated by the failure of some owners to pay their taxes resulting in insufficient funds to meet the District's current bond payments. In effect it compels those who pay to

(1) Farms under 20 acres were granted a five-year moratorium on construction assessments; farms over 20 acres three years. These deferred charges were carried forward and as "capitalized interest" became a part of the total principal assessment, See Table V.

bear the burden of those who do not.

In addition to the charges already mentioned, there is a Guaranty Fund, a special levy of 0.2 per cent of the assessed benefit each year for contingency purposes. This levy is not included in the limitation of 7 per cent of total assessment mentioned above.

Non-agricultural land is not included in Table III. Urban land amounting to 3,250 acres plus an estimated 7,000 acres for state and county highways and an undetermined amount of Santa Fe Railroad and other public utility rights of way, carry a much higher percentage of per acreage costs. These costs cannot be compared on an acre basis with the agricultural lands. The benefit which urban owners, public utilities, and public corporations derived from flood control and such intangibles as increased land values and increased purchasing power of the rural population was considered important enough to warrant larger benefit appraisals. Table VI indicates the amounts and percentages of costs carried by the various property interests.

About 45 per cent of the project is carried by the agricultural land; about 15 per cent by private urban property; about 23 per cent by the public utilities; the remaining 17 per cent by the State and other public corporations.

Collections and Delinquency

For the period 1929-1933 inclusive, collections were sufficient to cover bond fund payments; that is collections were above the anticipated 90 per cent collection. The 3-year period of grace on farms over 20 acres expired in 1932; the 5-year period of grace for farms under 20 acres expired in 1934. Hence 1934 is the first year in which all lands had to pay interest charges on the bond issue. For the entire district the delinquency in 1934 was about 35 per cent, in 1935 about 70 per cent. The total delinquency figures, as of May, 1936, on bond levies and maintenance assessments for the various types of benefited properties, are shown in Tables VII and VIII.

Combining the figures on both bond levies and maintenance assessments, the total delinquency for the district, as of May, 1936, is \$565,000, nearly 42 per cent of the total levy to date. The public utilities are less than 1 per cent delinquent, the state and public corporations about 15 per cent delinquent, private owners of urban property about 25 per cent delinquent, and private owners of agricultural property about 70 per cent delinquent in their payments. In terms of corporate misery, 82 per cent of the suffering is due to the farmers, 11 per cent due to private owners of urban property, 6 per cent due to the state and counties, and less than 1 per cent due to public utilities.

The reasons for this delinquency and its ultimate effect upon the ownership and use of the lands concerned are both questions that are the subject of much speculative comment, but very little specific information is available. To obtain a more concrete picture of the conditions obtaining in the district, a small sample, consisting of five maps ⁽¹⁾ (4500 acres, about 1/22 of the District) in the vicinity of Los Lunas in Valencia County, was subjected to analysis. The results of that analysis are here presented. The sample was chosen on the recommendation of Mr. Phillippi, Assistant Engineer of the Conservancy District, as an area in which delinquency was high and one in which numerous changes in land ownership were taking place. The data presented were taken directly from the Conservancy District records in the Head Office, Albuquerque, through the courtesy of Mr. Phillippi.

Specific data on the types of crops cultivated in the area sampled are not available. The area is, however, like the Conservancy District as a whole, largely one of non-commercial use, with small farms growing subsistence crops.

All the land included in the sample is either now cultivated or is supposedly cultivable as a result of the Conservancy

(1) "Maps" are the Conservancy District's designation for their major subdivisions, a map comprising one to two sections, or parts thereof. Maps are further subdivided into tracts, individually owned.

program. Of the total of 4500 acres in the sample the survey of 1928 classified 1,072 acres (23 per cent) as irrigated land (devoted to orchard, garden, alfalfa and grain) and the balance as non-irrigated (bosque, swamp, dunes, etc.) Approximately three-fourths of the area in 1928 provided no more effective use than grazing, and some of this percentage, in barren dunes and swamps, was even unsuitable for forage. (See Table IX). The amount of this non-irrigated land which has been brought into more effective agricultural use since 1928 is not known, but the application of the District Engineer's 10 per cent estimate for the entire district to the present sample indicates only 340 acres have been so converted. The failure of owners to bring into production larger acreages of the reclaimed and now potentially productive land has already been cited as a cause of Conservancy District embarrassment. This land, whether in production or not, is assessed annually with bond and maintenance levies averaging about \$3.50 per acre.

(1)

The total acreage in the sample is 3100, divided in 1928 into 154 tracts, an average of 20 acres. Splitting of tracts due to sales and partition proceedings had increased the

(1) In order to avoid distortion, one large holding of more than 1400 acres (in two tracts), owned by the Gen. Amer. Life Ins. Co., has been excluded in the averages here presented. The only other large holdings in the area sampled, one of 136 acres (consisting of two tracts) and one of 690 acres (consisting of five tracts) are included in the average figures.

number of tracts in 1935 to 233, with an average of 13 acres.

This average is still considerably above the average of six acres for the entire Conservancy District in 1935 (100,000 acres - 17,000 tracts). The average acreage for Spanish-American owned tracts was 16 in 1928, 10 in 1935; the average for Anglo-owned tracts in 1928 was 39 acres, in 1935, 31 acres. Both Anglo and Spanish-American tracts showed a decrease in size over the period.

(See Table X). This splitting of tracts and reduction of acreage is another one of the causes advanced by Conservancy District officials as a reason for their present financial condition, since it reduces the tract to insufficient size and frequently improper shape for efficient use. No evidence is presented by the officials for this assumption.

Since multiple ownership of tracts is not uncommon in the area, a realignment of the acreage by individual holders was made. These figures (included in Table X) indicate that individual holdings also decreased over the 7 year period. The average holding of 27 acres for all owners in 1928 decreased to 19 acres (30 per cent) in 1935. Average holdings of Anglo owners decreased from 50 to 49 acres (2 per cent); those of Spanish-Americans from 22 to 14 acres (36 per cent). The greater decrease in the average holdings of the Spanish-American operators is doubtless prophetic of the readjustment that future years will

bring.

An array of the holdings by size as of 1935 shows 34 owners (20 per cent) with less than 3 acres, 90 owners (53 per cent) with less than 10 acres, and 123 owners (70 per cent) with less than the over-all average of 18 acres.⁽¹⁾ The array of the holdings by size for the different maps is shown in Table XI. Only eight holdings exceed 50 acres. Only three holdings, of 136 acres, 690 acres, and 1400 acres, the two largest owned by Anglos, are more than 100 acres. The 1400-acre holding, owned in 1928 by the Valencia Land and Livestock Co., is now the property of the General American Life Insurance Company. Its present use has not been ascertained.

The delinquency in payment of annual levies on agricultural lands for the entire conservancy district is approximately 70 per cent. In the Valencia County sample here considered the delinquency is considerably greater—88 per cent (See Table XII).

- (2)
- Analysis of this delinquency is revealing:
- 1) 89 per cent of the tracts are wholly or partially delinquent, with 69 per cent fully delinquent;
 - 2) 95 per cent of the acreage is wholly or partially delinquent, with 73 per cent fully delinquent;
 - 3) The average acreage of those tracts 100 per cent delinquent is 19, of those in part delinquent 21, and of those non-delinquent 9. This appears to be at variance with Conservancy District contentions that capacity to pay is dependent upon

(1) This average excludes one 1400-acre holding.

(2) See Table XIII.

increased acreage. But this variance may be only apparent since the smaller tracts are probably more completely worked than are the larger ones and yet do not carry such a large burden of uncultivated land on which assessments must be paid whether actually farmed or not. The average assessment per tract (\$500) is much smaller on those tracts not delinquent at all than upon those partially delinquent (\$1100), or wholly delinquent (\$1075).

- 4) The per acre delinquency shows that the more high assessed acreage is less delinquent than the acreage with lower assessments.

Delinquency was also analyzed from the ethnic standpoint.

This is shown in Table XIV. Of 143 Spanish-American owners, 101 (70.6 per cent) were fully delinquent, 29 (20.3 per cent) were in part delinquent, 13 (9 per cent) were not delinquent at all. Of 24 Anglo owners 15 (62.5 per cent) were fully delinquent, 6 (25 per cent) were in part delinquent, and 3 (12.5 per cent) not at all delinquent. Ninety-one per cent of the Spanish-Americans, 87.5 per cent of the Anglos were all or in part delinquent.

This sample indicates that the delinquency is less inherent in the ethnic group than it is in the land or the methods of cultivating it. Insofar as payment of assessments indicates capacity to make the land pay, the Anglos are but slightly more successful than the Spanish-Americans.

Some changes in ownership of the farms included in the sample have taken place. Whether outright purchase or the buying

of tax titles on delinquent property is the most responsible factor in these changes is not evident. Omitting map 80 from consideration because it was entirely Anglo-owned both in 1928 and 1935 and hence tends to obscure other changes by its inclusion, it is found that:

of 101 owners in 1928, 7 (6.9 per cent) were Anglos
 of 156 owners in 1935, 13 (8.9 per cent) were Anglos,

an increase of two per cent.

In terms of acreage, however, the change is more impressive. Again excluding map 80,

of 2990 acres in 1928, 902 acres (31 per cent) were owned
 by Anglos
 of 3113 acres in 1935, 1172 acres (38 per cent) were
 owned by Anglos

an increase of seven per cent.

Since, due to a moratorium on tax payments at the beginning of Conservancy District operations, conservancy charges were not felt against most of the acreage until 1934, it is fair to assume that most of the pressure working toward land turnover was exerted after that time. If such is true, an increase of 2 per cent in the number of Anglo owners and an increase of 7 per cent in Anglo-owned acreage in such a short time as one or two years confirms the prevalent opinion found in casual conversation that a new type of farmer, presumably Anglo, will acquire possession of the Middle Rio Grande lands.

Recent Economic Survey of the Conservancy District

In 1935, in an effort to find out why the Conservancy District was not paying its way, an Economic Survey of the Middle Valley was made under the direction of the New Mexico Agricultural Extension Service. The reference material obtained and reports made by the various committees were brought together in a single volume and published in May, 1936. The following are the pertinent comments and recommendations:

- 1) "The outstanding problem at the present time is how to bring the project into production so that Conservancy charges may be met."....
- 2) Before even local markets can be made available outside competition must be met.
- 3) Feed Production and Livestock: Until a good cash crop is developed, best market for feed produced is livestock.
- 4) Crop yields are too low to be profitable. These due to many factors--poor seed, poor farming methods generally.
- 5) Farms are too small for profitable operation. Each operator should "attempt to own and operate a tract of at least 30 acres."
- 6) The Reconstruction Finance Corporation should be asked to advance funds to landowners to enable them to bring land into production.
- 7) Increase the acreage of alfalfa (present leading cash crop) but not to exceed 50% of the crop land.
- 8) Increase dairying and poultry raising in the district.
- 9) Do not expand production of wheat and dry beans beyond local market demands.

- 10) Be wary of cotton production.
- 11) Limit fruit and vegetable production on a commercial basis only to local market needs. All farmers to produce as much of their own fruit and vegetables as possible.
- 12) Extend efforts of each farm to be self-sufficing.
- 13) For young people, 4-H clubs for training and recreation.
- 14) Tenancy should not be encouraged, but "any changes to be made (in renting) will have to be agreed upon by landlord and tenant." Steps should be taken to clear up land titles and form reasonable interest loan corporations.

Conclusions or recommendations which could pretend to be valid would require a good deal more information than is contained in the foregoing report. A few suggestive conclusions, however, may be tentatively stated. The Middle Rio Grande Valley is an area of small non-commercial farms, producing at their present level of use a large part of the subsistence of their operators but only a small cash income. The Conservancy program, though it has improved the physical condition of much of the land, has imposed upon it a new and additional burden of cash costs. These cash costs as measured against the cash income at present derived from the land are imposingly large. The record of delinquency in payments to the Conservancy District is eloquent testimony to this fact. In the absence of any change in the financial structure of the Conservancy District the present situation

must inevitably lead to either the attempt at change of the present farm operators from a subsistence to a commercial type of operations, or the dispossession of the present operators and their replacement by another group who will attempt to carry on commercial operations. In either case the Conservancy District may remain insolvent. Much of the energy of Conservancy District officials and of various business interests in the area are now being directed toward some solution of this problem. Several salient facts appear to demand consideration in any attempt at solution.

1. The ten-million-dollar cost of the Conservancy District was initially justified on the grounds that in addition to improving and protecting some 45,000 acres of cultivated land, an additional 55,000 acres would be brought into such profitable production that they could be made to bear a sizable share of the tax burden. Only a small percentage of such new land has actually been brought into production. Two possible explanations for this suggest themselves. Either the funds necessary to clear, level, and otherwise prepare the land for cultivation have not been available to the owners; or, if funds were available, their investment in this manner has not been considered wise. On the basis of the evidence now available it appears likely that the first statement is correct; it is possible, however, that the second statement is also correct.

2. The assumption that the 55,000 acres at present unused but susceptible of cultivation may profitably be used for the production of surplus crops, and that the land at present cultivated may also be put to profitable commercial use is as yet unproven. It remains to be demonstrated that the available market for such crops as may be grown in the area is such that it will supply cash returns sufficient to cover production costs, conservancy district charges, and some small amount for the livelihood of the farm operator. Officials of the Conservancy District and State Extension workers are not unaware of this fact. The economic survey conducted in 1935 is evidence of their concern. The material of that survey is, however, more suggestive of the problems to be solved than it is convincing in its solution of them.

3. In the light of the above and of the recent experience of new-comers to the area the hypothesis, widely supported in certain quarters, that the solution lies in either the transformation of the Spanish-American farmers into commercial operators, or their replacement by Anglo-American farmers long accustomed to commercial operation, seems to require close scrutiny. Neither process offers any certain guarantee of success. The second, if the history of other similar projects may be considered analogous, promises social consequences now regarded as undesirable: a large, dependent and resourceless population in an area

where almost no market for labor exists; and a considerable field for real estate speculation.

4. The possibility that the conservancy project may never be self-liquidating and that some portion of its cost may need to be absorbed by persons or interests other than the land-owners seems to merit consideration.

Within the limits set by these and other considerations the future of the Middle Rio Grande Valley and its inhabitants will be set at some time in the future.

Table I

Farm Operators by Tenure, 1925, 1930, 1935, (1)
Bernalillo, Socorro and Valencia Counties.

	Total For 3 Counties									
	Bernalillo			Socorro			Valencia			Total
	1935	1930	1925	1935	1930	1925	1935	1930	1925	1930
Full owners	1462	1027	1126	966	700	835	1873	1011	1078	2738
Part owners	80	58	31	256	85	129	114	164	170	307
Managers	21	8	9	4	9	12	20	3	10	20
Tenants	225	155	68	176	55	94	195	96	103	306
Cash Tenants		65	32		11	23		32	26	108
Other Tenants		90	36		44	71		64	77	198
Totals	1788	1403	1302	1402	904	1164	2202	1370	1464	3677
Proportion of Tenancy	12.6	11.0	5.1	12.5	6.0	8.1	8.9	6.3	7.0	8.3
Proportion of cash tenancy		41.9	47.0		20.0	24.4		33.3	25.3	35.3

(1) From U. S. Census of Agriculture, 1930 and 1935.

Table II

Farm Land According to Use - 1930, 1935
Bernalillo, Socorro, & Valencia Counties

	Bernalillo		Socorro		Valencia		Total 3 Counties	
	1935	1930	1935	1930	1935	1930	1935	1930
1) All Farm Land	179,834	84,876	1,234,690	917,770	1,151,527	625,768	2,566,051	1,628,414
2) Land Avail. for Crops								
a) Including Flow-able Pasture	32,717	28,764	82,410	26,189	57,916	41,179	173,043	96,132
b) Excluding "	29,281	21,040	34,480	17,543	25,285	21,383	89,046	59,966
3) Crop Land Harvested	10,097	17,865	5,703	9,165	14,460	16,276	30,260	43,306
4) Crop Failure	16,610	1,182	25,813	2,185	7,675	1,302	50,098	4,669
5) Crop Land Idle or Fallow	2,574	1,993	2,964	6,193	3,150	3,805	8,688	11,991
6) Pasture and Other Land	147,117	56,112	1,152,280	891,581	1,093,611	589,589	2,475,418	1,537,282
7) Total No. of Farms	1,788	1,248	1,402	849	2,202	1,274	5,392	3,371
8) Av. Acreage per Farm	100.6	68.0	880.7	1,081.0	522.9	491.2	476.0	483.0

Table III

Classification of Lands Included in
the Middle Rio Grande Conservancy
District (1928)

Type	Cochiti Division	Albuq. Div.	Belen Div.	Socorro Div.	Total
Grand Total (all types)	10,396	37,808	59,372	15,821	123,397
Total Net Irrigable:	10,396	34,958	59,132	15,661	120,147
Total non-Indian:	1,412	30,482	52,977	15,661	100,532
Cultivated:	977	15,610	24,628	5,057	46,272
Orchard, Garden,					
Alfalfa, Grain:	969	13,410	18,319	4,583	37,281
Pasture and Hay:	8	2,200	6,309	474	8,991
Non-cultivated:	435	14,872	28,349	10,604	54,260
Salt grass	180	5,462	16,438	2,230	24,310
Bosque	176	3,239	4,340	7,274	15,029
Swamp and Lake	5	772	899	873	2,549
Sand dunes	1	2,753	1,853	44	4,651
Gravel	18	350	50	110	528
Mesa and Upland	41	1,560	4,631	47	6,279
Platted Rural Homesites	14	736	138	26	914
Total Indian	8,984	4,476	6,155		19,615
Cultivated	3,675	1,354	3,454		8,483
Non-cultivated	5,309	3,122	2,701		11,132
Total Area in Cities and Towns		2,850	240	160	3,250

Sources: Official plan of the Middle Rio Grande Conservancy District,
for non-Indian figures.
Indian Irrigation Office for Indian figures.

Table IV

Classification of Land by types and Sub-types,
the appraised benefits, and the original assess-
ment. (1)

Type of Land	Appraised Benefits per Acre	Original Assessment per Acre
1. Alfalfa and Grain		
A-1st class lands, served by best avail. ditches; good drainage	\$70.00	\$30.80
B-Lands either served by an unsatisfactory ditch or having poor drainage	80.00	35.20
C-Lands with detracting fea- tures, such as poor drainage and an unsatisfactory ditch	95.00	41.80
2. Vega and Salt Grass		
A-Lands used for pasture or hay production and having a high water table	105.00	46.20
3. Bosque		
A-Lands covered by brush or timber	99.00	39.60
4. Swamp and lake	120.00	52.80
5. Mesa and Upland		
A-Considerable leveling nec- essary and irrigation now impossible	120.00	52.80
6. Rough Land (Sand dunes)		
A-Lands relatively easy to level	100.00	44.00
B-Lands requiring considerable leveling	70.00	30.80
7. Gravelly land	75.00	\$25 to \$35
8. Orchard Land		
A-Young orchard		20 to 25
B-Orchard of medium age	50.00	20 to 25
C-Old orchard, classed as alfalfa and grain land	\$70 - \$90	\$30.80 to 41.80

(1) Information from Bulletin 215, New Mexico Agric. Experiment Station.
Appraisal sheets in Middle Rio Grande Conservancy District Office.

Average per Acre Assessments
and levies on non-Indian Agricultural
Lands - Middle Rio Grande Conservancy
District

Class of Land	Appraised Benefits	Original Assessment	Capitalized Interest (1)	Total Prin.	Prin. & Int.	Maintenance(2)	Total Ann. Lev.
1st class cultivated	65.00	28.60	6.00	34.71	1.87	.52	2.39
2nd class cultivated	80.00	35.20	7.53	42.73	2.31	.64	2.95
3rd class cultivated	95.00	41.80	8.94	50.74	2.74	.76	3.50
Bosque	90.00	39.60	8.47	48.07	2.60	.72	3.52
Sand Dunes "A"	100.00	44.00	9.40	53.40	2.88	.80	3.68
Sand Dunes "B"	70.00	30.80	6.69	37.49	2.02	.56	2.58
Salt Grass & Vego	105.00	46.20	9.88	56.08	3.03	.84	3.87
Swamp & Upland	120.00	52.80	11.29	64.09	3.46	.96	4.42
Average	100.00	44.00	9.40	53.40	2.88	.80	3.68

(1) "Capitalized interest" is interest accumulated during the period of grace at beginning of operations. This was 5 years for owners of less than 20A; 3 years for owners of more than 20 A. "Total Principal" includes this "capitalized interest" and original assessment.

(2) At 1935 rate of 0.8 per cent. The 1936 rate was 0.9 per cent.

Table VI

Appraised Benefits, Assessments, Annual Levies
by Different Types of Property, M.R.G.C.D. - 1936

	Appraised Benefits			Assessment			1936 Bond Fund Levy			Maintenance Levy			Total 1936 Levy		
	% of		Amount	% of		Amount	% of		Amount	% of		Amount	% of		Amount
	Amount	Total		Amount	Total		Amount	Total		Amount	Total		Amount	Total	
Private owners Agric. Lands	9,688,599.85	44.5	4,262,845.34	287,849.92	48.8	87,346.94	44.2	375,196.86	47.1						
Private owners Urban property	3,418,094.95	15.7	1,503,960.18	85,378.60	14.2	30,893.54	15.7	116,272.14	14.1						
Public Utilities	5,047,892.00	23.2	2,221,072.48	126,185.96	21.4	45,430.94	23.1	171,616.90	21.1						
Pub. Corps. and State	3,605,328.73	16.5	1,586,344.36	90,226.84	15.3	32,472.67	16.6	122,699.51	15.1						
Boards of Education	2,783.00	0.1	1,224.53	71.54	0.1	802.41	.4	873.95	0.1						
Totals	21,762,689.53	100.0%	9,575,446.89	589,712.86	99.8%	196,946.50	100.0%	786,659.36	99.1						

From statement of Conservancy District, dated October 31, 1936.

Table VII

(1)

Bond Levy Delinquency, May, 1936
Middle Rio Grande Conservancy District

	Bernalillo	Sandoval	Socorro	Valencia	State of New Mexico	Totals
Private owners (agric.) Amount delinquent % of delinquency	\$63,262.37 46.6%	\$17,995.17 60%	\$123,524.60 83.5%	\$164,468.81 78.8%		\$369,251.95 70.8%
Private owners (urban) Amount delinquent % of delinquency	38,534.48 23%	4,044.99 65%	2,078.95 50%	3,991.83 51.5%		48,650.25 26.7%
Public Utilities Amount delinquent % of delinquency	none 0%	389.64 1.4%	177.33 0.3%	none 0%		566.97 0.2%
Public Corps. & State Amount delinquent % of delinquency	9,788.19 9.5%	885.94 2.8%	2,229.08 26.7%	465.31 3.4%	12,147.03 38.7%	25,515.55 15.9%
Totals Amount of delinquency % of delinquency	111,585.04 22.1%	23,315.74 33.3%	128,009.96 61.5%	168,925.95 65.1%	38.7%	431,836.69 40.4%

(1) From Conservancy District ledger sheets. An inconsequential amount of school district levy and delinquency have been omitted.

Table VIII

(1)
Maintenance Assessment Delinquency, May, 1936
Middle Rio Grande Conservancy District

	Bernalillo	Sandoval	Socorro	Valencia	State of New Mexico	Totals
Private owners (agric.) Amount of delinquency % of delinquency	\$27,728.02 79.4%	\$4,379.93 60% *	\$29,901.57 85.7%	\$42,810.80 81%		\$104,820.32 80.6%
Private owners (urban) Amount of delinquency % of delinquency	7,906.92 18.7%	1,271.50 69.8% *	235.76 62.5%	1,059.41 57.3%		10,473.59 22.5%
Public Utilities Amount delinquent % of delinquency	none 0%	64.41 0.7%	36.95 0.2%	none 0%		101.36 0.2%
Public Corps. & State Amount delinquent % of delinquency	1,974.24 6.4%	176.87 23.7%	389.77 17.8%	207.55 4.8%	4,479.05 45.3%	7,227.48 15.1%
Totals Amount of delinquency % of delinquency	37,609.18 26.6%	5,892.71 30.7%	30,564.05 54.7%	44,077.76 64.2%	4,479.05 45.3%	\$122,622.75 42.1%

* Figures slightly inaccurate, estimated by using proportionate figures from bond levy sheet.

(1) From Conservancy District ledger sheets. An inconsequential amount of school district assessment & delinquency have been omitted.

Table IX

Irrigated and non-Irrigated Lands by
Acreage and Percentage, 1928, in
Valencia County Sample. (1)

	Map 76	Map 77	Map 78	Map 79	Map 80	Totals
Total Acreage	846.27	503.11	399.42	1261.23	1539.86	4549.89
Irrigated Acreage (2)	182.12	201.37	140.79	253.28	294.78	1072.34
% of Irrigated "	21.5%	40.%	35.3%	20.0%	19.8%	23.5%
Non-irrigated Acreage (3)	664.15	301.74	258.63	1007.95	1245.08	3477.55
% of Non-irrigated Acreage	78.5%	60.%	64.7%	80.%	81.2%	76.5%

(1) From Conservancy District records.

(2) Includes land devoted to orchard and garden, alfalfa and grain.

(3) Included pasture, bosque, swamp, dunes, salt grass, fallow, home-sites; of the non-irrigated lands 53% are salt grass, 33% are pasture.

Table X

Changes in Ownership and Splitting of Acreage 1928 - 1935
in Valencia County Sample. (1)

	Map 76		Map 77		Map 78		Map 79		Map 80		(2)		Total all Maps Entire Sample
	1928	1935	1928	1935	1928	1935	1928	1935	1928	1935	1928	1935	
(1) Total No. of Tracts	44	81	32	39	34	50	32	50	12	13	154	233	233
(2) No. owned by Sp-Am.	43	70	32	38	33	48	23	39	0	0	131	195	195
(3) No. owned by Anglos	1	11	0	1	1	2	9	11	12	13	23	38	38
(4) Av. Acr. of Tracts	18.31	10.45	15.72	12.90	11.75	7.99	35.95	24.67	11.01	10.86	19.42	13	13
(5) Av. Acr. Amer. "	17.62	10.13	15.72	12.91	11.95	7.96	19.38	11.59	0	0	15.94	9	9
(6) Av. Acr. Anglo "	47.90	12.48	0	12.40	5.00	8.70	78.30	78.53	11.01	10.86	39.22	30	30
(7) Av. holding all owners	29.83	16.27	20.96	16.77	15.36	10.51	47.94	34.27	12.01	12.83	26.70	18	18
(8) Av. holding all Span. Americans	17.62	15.08	20.96	16.92	15.78	10.61	23.46	14.57	0	0	22.22	13	13
(9) Av. holding all Anglo	47.90	27.45	0	12.40	5.00	7.96	140.95	172.77	12.01	12.83	50.12	48	48

(1) From Conservancy District records.

(2) Omitting 1400 A. owned by Gen. American Ins. Company.

Table XI

Land Holdings by size of holding in
Valencia County sample, 1935.
(Data From Conservancy District Records)

Holding (in acres)	Map 76	Map 77	Map 78	Map 79	Map 80	Total all Maps
0.01 - 1.00	7	1	2	1	0	11
1.01 - 2.00	3	0	2	3	0	8
2.01 - 3.00	3	2	8	2	0	15
3.01 - 4.00	0	1	4	3	0	8
4.01 - 5.00	0	1	0	3	0	4
5.01 - 6.00	1	2	3	3	0	9
6.01 - 7.00	2	1	0	2	0	5
7.01 - 8.00	4	2	4	0	0	10
8.01 - 9.00	4	3	0	1	0	8
9.01 - 10.00	2	2	1	0	7	12
10.01 - 11.00	2	3	0	2	0	7
11.01 - 12.00	2	4	0	0	0	6
12.01 - 13.00	0	2	0	2	0	4
13.01 - 14.00	0	0	1	3	0	4
14.01 - 15.00	1	0	0	0	0	1
15.01 - 16.00	1	0	0	4	0	5
16.01 - 17.00	0	0	3	2	1	6
17.01 - 18.00	1	0	1	0	0	2
18.01 - 19.00	2	0	1	1	2	6
19.01 - 20.00	0	0	1	0	1	2
20.01 - 25.00	4	1	4	1	0	10
25.01 - 30.00	5	1	0	0	0	6
30.01 - 35.00	1	1	0	2	0	4
35.01 - 40.00	2	0	1	0	0	3
40.01 - 50.00	6	0	0	0	0	6
50.01 - 100.00	0	1	1	3	0	5
100.01 and over	0	1	0	1	1	3
Totals	53	29	37	39	12	170

Acres of tracts over 50 acres

136.19	52.40	689.14	1398.74
90.70		86.78	
		74.51	

Table XII

Amount & Percentage of Delinquency in
Bond & Maintenance Assessments, Valencia
County Sample, Middle Rio Grande Conservancy
District, 1935

Maps	Bond & Maint. Assessment	Paid	Delinquency	Per Cent Delinquent
Map 76	\$ 5,588.46	\$ 647.98	\$ 4,940.48	88%
Map 77	3,454.09	263.90	3,190.19	92%
Map 78	2,964.32	807.53	2,156.79	73%
Map 79	8,303.56	1,565.20	6,738.36	81%
Map 80	9,799.57	218.87	9,580.70	97%*
All Maps	30,110.00	3,503.48	26,606.52	88%

* The high delinquency in Map 80 is largely accounted for by the non-payment of any assessments to date by the General American Life Insurance Company on its 1400 acres. If this \$8,868.49 assessment is omitted the percentage of delinquency for Map 80 falls to 70 per cent.

Table XIII

Analysis of Delinquency in Bond and Maintenance
Assessments Valencía County Sample, Middle Rio Grande
Conservancy District (1)

Total all
Maps Val-
encia Co.
Sample

	Map 76	Map 77	Map 78	Map 79	Map 80	
(1) Total No. of Tracts 1935	81	39	50	51	15	236
(2) No. of tracts 100% delinquent	57	31	32	32	11	140
(3) No. of tracts some % delinquent	13	7	14	12	2	33
(4) No. of tracts no % delinquent	11	1	4	7	2	28
(5) Percent of tracts 100% delinquent	69.51%	77.50%	64.00%	60.38%	73.33%	69.00%
(6) Percent of tracts some % delinquent	16.05%	17.95%	28.00%	23.53%	13.33%	20.00%
(7) Percent of tracts no % delinquent	13.58%	2.56%	8.00%	13.73%	13.33%	11.00%
(8) Total Acreage	846.27	503.11	399.42	1261.23	1539.86	4,549.89A
(9) Acreage 100% delinquent	705.28	399.79	255.67	448.42	1504.28	3,313.44
(10) Acreage some % delinquent	59.59	96.92	82.72	760.17	16.33	1,015.73
(11) Acreage no % delinquent	81.40	6.40	61.03	52.64	19.25	220.72
(12) Per cent of acreage 100% delinquent	83.34%	79.46%	64.01%	35.55%	97.69%	72.82%
(13) Per cent of acreage some % delinquent	7.04%	19.26%	20.71%	60.27%	1.06%	22.32%
(14) Per cent of acreage no % delinquent	9.62%	1.28%	15.28%	4.18%	1.25%	4.85%
(15) Average Acreage of Tracts	10.45A	12.90A	7.99A	24.73A	102.66A	19.28A
(16) Average acreage of tracts 100% delinquent	12.37A	12.90A	7.99A	14.01A	136.75A	19.23A
(17) Average acreage of tracts some % delinquent	4.58A	13.84A	5.91A	63.35A	8.17A	21.16A
(18) Average acreage of tracts no% delinquent	7.40A	6.40A	16.26A	7.52A	9.62A	8.82A
(19) Average Assessment per Tract	547.48	660.31	428.32	1274.06	5460.21	1,078.75
(20) Average assessment per tract 100% delinquent	650.51	658.85	432.43	740.10	7266.08	1,116.49
(21) Average assessment per tract some % delinquent	219.92	700.00	344.67	3275.26	448.33	1,068.37
(22) Average assessment per tract no% delinquent	399.81	213.78	825.60	391.38	539.76	498.00
(23) Average Assessment per Acre	52.40	51.18	53.61	51.52	53.19	52.40
(24) Average Assessment per acre 100% delinquent	52.57	51.09	54.12	52.81	51.81	52.20
(25) Average assessment per acre some % delinquent	47.98	50.57	58.33	51.70	54.91	51.96
(26) Average assessment per acre no% delinquent	54.03	55.52	54.11	52.04	56.08	53.80

(1) Data from Conservancy District Records

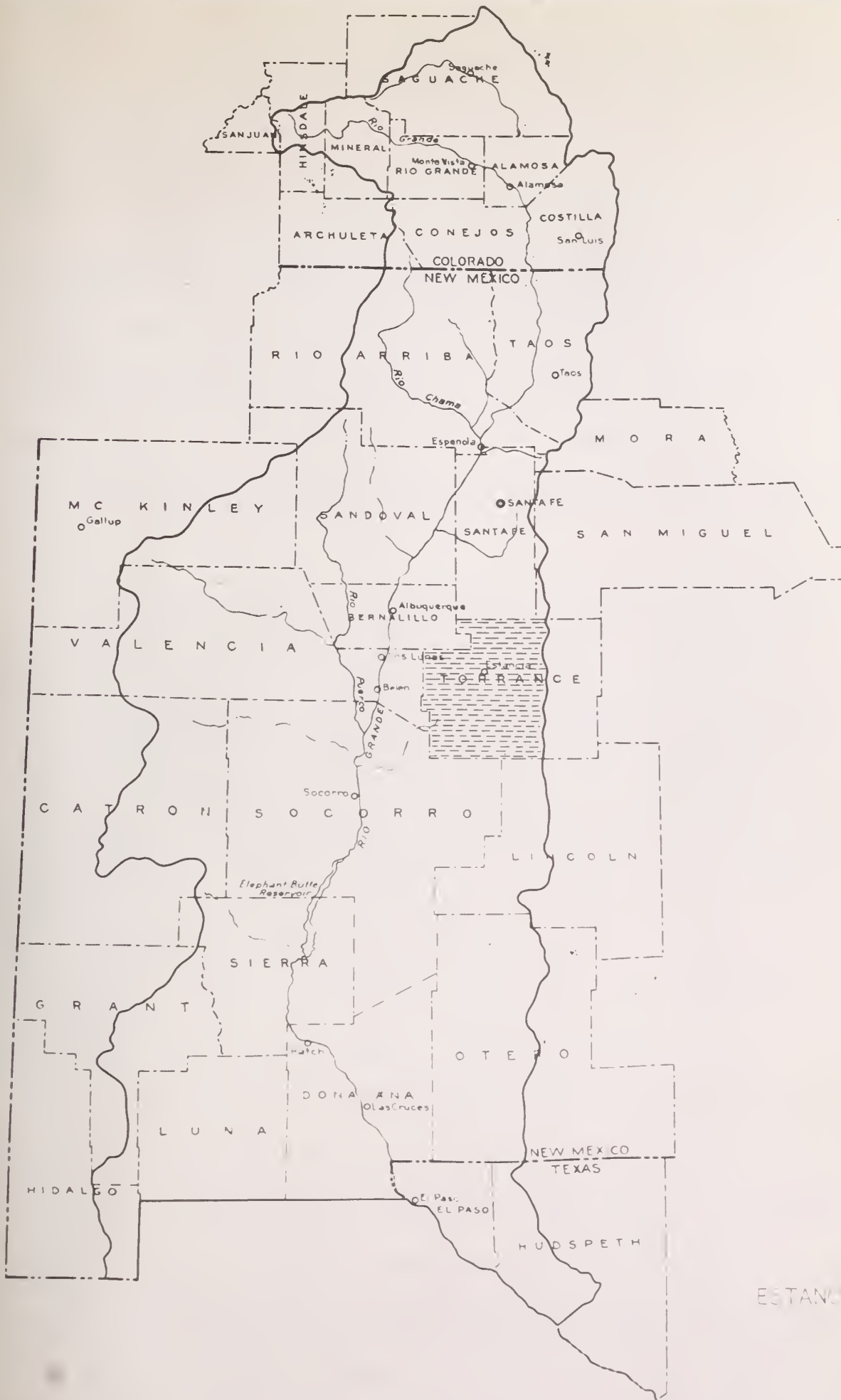
Table XIV

Delinquency According to Ethnic Affiliation in ValenciaCounty Sample, Middle Rio Grande ConservancyDistrict (1)

	Map 76	Map 77	Map 78	Map 79	Map 80	Total All Maps
<u>TOTAL DELINQUENCY</u>						
No. of owners 100% delinquent	36	22	26	24	8	116
Spanish-American owners	34	22	24	21	0	101
Anglo Owners	2	0	2	3	8	15
No. of owners some % delin.	9	7	11	7	1	35
Spanish-American Owners	7	6	11	5	0	29
Anglo Owners	2	1	0	2	1	6
No. of owners not delinquent	7	1	1	5	2	16
Spanish-American Owners	6	1	0	5	0	13
Anglo Owners	1	0	1	0	2	3
% of Owners 100% Delinquent	69.23%	73.34%	68.42%	66.67%	72.73%	69.46%
Spanish-American Owners	72.34%	75.86%	66.67%	67.74%	0.00%	70.63%
Anglo Owners	40.00%	0.00%	100.00%	60.00%	72.73%	62.50%
% of Owners some % Delin.	17.31	23.37	28.95	19.44	9.09	20.96
Spanish-American Owners	14.89	20.69	30.55	16.37	0.00	20.28
Anglo Owners	40.00	100.00	0.00	40.00	9.09	25.00
% of Owners not Delinquent	13.46	3.33	2.63	13.89	18.18	9.58
Spanish-American Owners	12.77	3.45	2.78	16.13	0.00	9.09
Anglo Owners	20.00	0.00	0.00	0.00	18.18	12.50
No. of Individual Owners	52	30	38	36	11	167
Spanish-American Owners	47	29	36	31	0	143
Anglo Owners	5	1	2	5	11	24

(1) Data from Conservancy District Records.

Estancia Unit



LEGEND

1930 U.S. Census Data

UNITED STATES
DEPARTMENT OF AGRICULTURE
BUREAU OF CONSERVATION SERVICE
RIO GRANDE WATERSHED
1937

The Estancia Valley is an inland drainage whose center is approximately 50 miles southeast of Albuquerque. It extends from the Sandia and Manzano mountains about 45 miles eastward to the hills marking the eastern rim of the Rio Grande Watershed. Its extent from north to south is approximately 60 miles. It comprises roughly the area contained within Torrance County.

Previous to 1900 the Estancia Valley was unsurveyed public domain, uninhabited and unused save by a few large livestock ranches. In 1905 the area was opened to homestead entry and was rapidly settled by migrants from the Middle West, most of them from Kansas and Oklahoma. By 1907 all the land suitable for either dry-farming or grazing was occupied and the valley had taken on the checkerboard appearance it has today, with small sections of cultivated land regularly interspersed with larger areas of unbroken grazing land.

Directly after settlement livestock was an important source of income and cultivated land was used principally for the raising of supplemental feed and forage crops. Shortage of water and the absence of extensive uncontrolled areas suitable for grazing led to the relative decline in importance of livestock grazing, according to local residents. The cultivation of pinto beans as a cash crop rapidly assumed primary importance.

The most striking aspect of the economy of the Estancia Valley today is that pattern of human activities developed around the commercial production of beans. In Torrance County, which is here taken to define the Estancia Valley, 74,713 acres, or 77 per cent of the total crop land, were in beans; and 78 per cent of the farms produced beans as their principal (1) crop. Of other crops the largest acreage, 8,763 acres, was corn and was only 9 per cent of the total crop land. The next largest class of farms was stock ranches, of which there were only 88, or 8.3 per cent of total. From these figures it is evident that the agricultural activities are centered about the production of beans.

There is no water available for irrigation in the valley, and conditions are such that yields are low and generally uncertain. Thus, the bean yield average over a long period has been only 390 pounds per acre with a number of years of almost complete failure. With such a yield and a price varying from 2¢ to 8¢ per pound it is necessary to operate large farm acreages in order to obtain a significant income. In addition, the terrain is level and uniform enough to allow extensive operations. The average cultivated land per farm in 1930 was 92 acres and there are, at present, many farms with over 300 acres. At least one farm has 1200 acres in

(1) U. S. Census, 1930.

cultivation.

This development of large farms devoted to a commercial crop makes the use of farm machinery, especially tractors, necessary. In 1930 the value of farm machinery was \$515 per farm and, according to various residents, about half the farmers now use tractors. This use of tractors is a result of a large cultivated acreage per farm; but, in itself, it also tends to increase cultivated acreage even more. The increased speed and power of a tractor as compared to a team enables one man to cultivate much more acreage in the same length of time with the resulting tendency to increase the acreage. Also, the operation of a tractor requires cash for gasoline, oil, and repairs which is greater than the cash required for the operation of farm teams. To meet this increased need for cash acreages are increased. Further, the common method of purchasing a tractor, e.g., the down payment may be made with teams or livestock and later payments secured by crop mortgages on a specified acreage of beans, is a further incentive for increased acreages. This trend toward increasing acreage is shown by the increase between 1930 and 1935, when, in spite of depression, the acreage of crop lands increased 65,000 acres, the average increase per farm being 16 acres, or 17 per cent.

Closely associated with the tendency toward increasing acreage is the extent of rented lands. For one thing, there is a large number of tenant farmers, 22 per cent of all bean farmers being tenants. Furthermore, there is a large number of owners who farm rented lands in addition to lands they own. One characteristic of the area is the system of renting land on shares rather than for cash rent, the custom being for the tenant to give one-fourth of the bean crop as rent. One of the characteristics of this arrangement is to allow farmers with insufficient capital to enter into farming operations. The effect on the area is to increase the cultivated acreage.

The uncertain nature of the crop seems to add another incentive toward increasing acreage. The farmer is dependent upon a commercial crop, yet has no alternative to beans. Thus, he is committed to plant beans regardless of fluctuation in price. As long as he must plant beans he is gambling on both the vagaries of the climate and of the market and he is tempted to expand his acreage in hopes of hitting the rare combination of a big crop and high prices. When such a coincidence occurs, the big farmer makes a large profit. If it fails, the incentive to liquidate his losses causes him to try the same operation another year. If he is unable to finance his operation

another year he goes bankrupt and abandons farming, or manages to acquire equipment and credit to start again as a tenant.

It is clear, then, that there is constant pressure forcing the farmer to increase his bean acreage. To do this he rents land and buys a tractor. The cost of the tractor and its upkeep, in turn, force even further increases of acreage. The effect of this increasing capitalization is to make the farmers more subject to foreclosure in the event of crop failure or a marked fall in the price of beans.

Another important characteristic of the bean crop is that it requires relatively little labor per acre. One man with tractor can cultivate 400 acres or more and may hire extra help only for harvesting. However, during harvest period a considerable amount of labor may be required. In 1929 only 490 bean farmers, 60 per cent, hired labor in addition to themselves and their families. They paid \$111,193 for⁽¹⁾ this labor, presumably almost all during harvest season. Since the wage rate ranges from \$1.25 to \$3.00 per day during harvest, the labor requirement was about 50,000 man days during a period of four to eight weeks, from September to October. Part of this labor was obtained from the small Spanish-American villages strung along the foothills west of the valley. The remainder was obtained from Santa Fe,

(1) U. S. Census, 1930.

Albuquerque, and the villages along the Rio Grande.

It is apparent that to raise and harvest a large acreage of beans requires a considerable amount of cash or credit. Formerly the local merchants would supply the farmers with their current requirements until the crop was harvested, taking a crop mortgage as security. One merchant, however, stated that although formerly such had been common practice, in recent years the crop had been so uncertain that the merchants had almost entirely stopped giving this type of credit. According to this man, most of the farmers attempted to raise enough produce to fill their dietary requirements and to sell milk and poultry to obtain ready cash. He estimated that many farmers receive \$40 to \$50 a month from their milk sales. This statement is supported by the fact that although only thirteen farms were classified as dairy farms in the 1930 census, 583 farms reported cows milked with a total production of 619,227 gallons. A trend toward greater dependence upon dairy products is indicated by the fact that the 1935 census showed 1034 farms with cows milked, an increase of 77 per cent, a much greater increase than the increase in the number of farms.

The use of the range in the Estancia Valley is closely related to the bean farming. Many farmers cultivate part of their farm and use the balance for pasture for work stock and

milk cows. Some have, in addition, small herds of beef cattle. With the increasing use of tractors in place of horses, the need for pasture is decreased and, at the same time, more land is brought under cultivation. With an increase in milk cows, however, there may be additional need for forage.

In addition to the farms cultivating land and raising livestock there are also a number of small stockmen and a few large ones. There is some use of National Forest for summer grazing by those farmers in the southern and western parts of the valley, and in the eastern part of the valley there is some use of the public domain. However, the principal use of available range within the district is by the stock of the commercial farmers who use it as a supplement to their crop farming.

This large scale cultivation of beans is of particular significance in view of certain characteristics of the physical environment. The area is characterized by high winds, low rainfall, and types of soil readily susceptible to wind erosion. When the beans are harvested the plants are either uprooted entirely or cut off at a level with the soil leaving it loosened and denuded of any protective covering. The result is that following the bean harvest the land is subject to severe wind erosion. The frequent and severe dust storms characteristic of the Estancia Valley are unpleasant

testimony to the destructive nature of the process. In the course of the thirty years of its occupancy the population of the valley has fluctuated considerably, and is now lower than it was immediately after settlement. Whether the Estancia Valley will continue, in the future, to support its present population will depend to some extent upon the measure of success which attends the efforts now being launched to stop the process of destruction of land resources.

Mosilla Unit

The agricultural area at the lower end of the Rio Grande watershed is almost identical with the Rio Grande Federal Reclamation Project, which extends through Sierra and Dona Ana Counties in southern New Mexico and El Paso County in west Texas. A small portion of the agricultural area extends beyond the project limits into the western end of Hudspeth County, Texas. The project area stretches along the Rio Grande river valley from about 100 miles north of the City of El Paso to about 40 miles southeast of El Paso, with a maximum width of 6 miles. The remaining land in the three counties is grazing land of low carrying capacity, which, as far south as El Paso, lies on either side of the agricultural area. Across the river from El Paso is the City of Juarez, Mexico, and from there southeastward the Rio Grande forms the international boundary line.

Elephant Butte Dam, which creates a storage reservoir for the project, is located on the Rio Grande 120 miles above El Paso. The combination of stored water from the reservoir, upon which a mean safe annual draft of 750,000 acre feet can be made, return flow, and a portion of the tributary side inflow has been an adequate and reliable water supply for the 155,000 (1) acres, to which the Federal project is limited. Of these

(1) Bulletin of Bureau of Reclamation: "Rio Grande Federal Reclamation Project, New Mexico--Texas", 1936.

155,000 acres of irrigable land in the project, over 140,000 acres are in cultivation. In addition, 25,000 acres in Mexico have been regularly supplied with water, and some 16,000 acres in Hudspeth County, Texas, below the project have received recovered water. The agricultural area is divided geographically into three valleys. The Rincon Valley, with an irrigable area of 16,000 acres extends from about 24 to 54 miles below the dam, with Hatch, New Mexico, its principal town. The Mesilla Valley, with an irrigable area of 82,000 acres, extends from the head of the pass 4 miles above El Paso about 55 miles in a northwesterly direction; Las Cruces, with a population of 6,500, is the principal town. The El Paso Valley extends about 40 miles southeast from El Paso, a city of over 100,000 people, and has an irrigable area of 57,000 acres.

Cultivation and irrigation in the immediate vicinity of El Paso dates back to about 1650, but in the valley above El Paso there was no settlement until 1840. In both instances, settlement was in the form of colonization of Old Spanish land grants. Each community constructed and maintained its own community ditch diverting water directly from the river without any type of storage.

In 1900, before the Elephant Butte Project was

(1)
determined to be feasible, there were 889 farms in the area, of which over 70 per cent were owned by their operators. A large majority of farmers were Spanish-American. Cash production costs were low; operation and maintenance of community irrigation ditches were by the labor of the water-users. Little farm machinery was in use, its value being only \$65 per farm, or approximately \$1.60 per crop acre. A very small proportion of the farms employed labor.

The farm population practiced a mixed type of commercial and non-commercial farming. Farmers satisfied the major part of their food needs from their own farms and in addition, raised some surplus crops for adjacent markets. Farmers were not dependent upon distant and fluctuating markets. The need for high cash returns was not great. Transfer of farms was relatively infrequent. Stability and security, rather than speculation and insecurity were characteristics of the area.

By 1904, when the Elephant Butte Dam project was
(2)
announced as feasible, there were approximately 39,000 acres

(1) U. S. Census, 1900: "A farm, for census purposes, is all the land which is directly farmed by one person, either by his own labor alone or with the assistance of members of his household, or hired employees....."

"The enumerator was instructed not to report as a farm any tract of land of less than 3 acres, unless its agricultural products in 1934 were valued at \$250 or more....."

".....When a land owner has one or more tenants, renters, croppers, or managers, the land operated by each is considered a farm."

(2) Bulletin of Bureau of Reclamation, op. cit.

in cultivation within the present project limits. In 1910, there were approximately 50,000 acres in crops, and about 1400 farms, over two-thirds of them owned by their operators.⁽¹⁾ Population on farms was approximately 6,000. In 1914, the year before the first stored water was supplied,⁽²⁾ there were about 65,000 acres in crops, about 1700 farms, and a farm population of about 7,700. By 1919, when cotton was introduced on about 1500 acres, there were 72,000 acres in crops, about 3,000 farms, and a farm population of about 12,000.⁽²⁾

Between 1910 and 1920, during which period the reclamation project began to function, changes in the nature of farming in the area occurred. The censuses of those two years indicate that the number of farms increased slightly and the average crop acres increased appreciably per farm. The proportion of full owners to all farm operators decreased, however, from 68 per cent to 53 per cent, with the absolute number of full owners also dropping by about 19 per cent. The proportion of tenants to all farm operators, on the other hand, increased from 23

(1) U. S. Census, 1910; Dona Ana & El Paso Counties. The number of farms is determined by deducting the estimated number of stock ranches from the total number of farms. All data on farms, unless otherwise noted, are from the U. S. Census. These census figures include only Dona Ana and El Paso Counties. The addition of the figures on Sierra and Hudspeth Counties would increase the crop acreage by about 20,000, and the number of farms by about 500, but would not change the characteristics of the area indicated by the more limited figures. The data on Sierra and Hudspeth Counties is less complete than the others and is hence excluded throughout.

(2) Bulletin of Bureau of Reclamation; op cit.

per cent to 34 per cent, with the absolute number of tenants increasing by 56 per cent. Similarly the proportion of farms employing cash labor increased from 53 to 71 per cent, with an increase in the absolute number from 807 to 1,139, or 41 per cent.

(1)
TABLE I

CHARACTERISTICS OF AGRICULTURE - MESILLA VALLEY

	1910	1920
No. Farms	1620	1596
No. Full Owners	1041	844
No. Tenants	350	546
No. Part Owners	108	145
No. Managers	21	61
Total Crop Acres	50,000	77,880
Average Crop Acres per Farm	33	49
No. Farms Employing cash Labor	807	1,139
Cash Labor Expenditures per Farm	\$ 234.00	\$ 611.00
Value Machinery per Farm	\$ 292.00	\$ 456.00
Expenditures for Fertilizer per Farm	0.77	10.56
No. Fully-owned Farms Mortgaged	179	229
Mortgage Debt per Fully-owned Mortgaged Farm	\$3,817.00	\$4,597.00

(1) U. S. Census, 1910, 1920. These figures, by virtue of the inclusiveness of the Census definition of farms, include a small number of stock ranches, so that the number of farms with irrigated cropland is probably approximately 50 less.

Cash expenditures for farm labor from 1910 to 1920 almost tripled, while crop acreage per farm increased by only about half, the expenditure per acre of cropland rising from approximately \$7.00 to \$12.50. The value of machinery per farm had increased from \$65 to 1900 to \$292 in 1910 and continued upward to \$456 in 1920. Expenditures per farm for fertilizer increased fourteen-fold. The proportion of fully-owned farms mortgaged increased from 17 to 27 per cent, and the average mortgaged indebtedness on these same farms increased about 21 per cent.

These changes appear to be consistently in the direction of a much more highly commercialized type of farming. Sharp increases in tenancy, in size of farms, in employment of farm labor, in cash expenditures for machinery, fertilizer, labor, and for irrigation water indicate clearly increased commercial production for a cash market. Bankruptcy and loss of farms became for the first time during those years not only a possibility but a constant threat for many farmers. While specific quantitative data are not available, there exists evidence that many of the original Spanish-American farmers, in the process of commercialization, were removed from their land through foreclosure.

The decrease in the number of owners indicates that some owner-operators either lost their farms, or became absentee

owners. In either case, the significant effect was a decrease in the size of that group of the population which owned farms without encumbrances and was in a position of relative security. The complement of this change was the development of a large absentee-owner group whose claim upon the resources of the area derived only from a legal title. An additional significant change was the development of a sizable class of farm laborers, most of whom were derived from the resident landless population, including the newly dispossessed Spanish-American farmers, and some imported from old Mexico.

This series of changes culminating in a markedly commercial type of farming, dispossession of many native farmers, and a high degree of insecurity and stratification of the farm population is not peculiar to this area. It has occurred and is occurring throughout the southwest. While present information is limited, several observations on the nature of this process may be made with some confidence. First, while the World War and the accompanying rise in the prices of agricultural commodities occurred during the years in which the changes were noted, it was not an important force in the development of this area. The acreage in crops in the area did increase by 30,000 during 1916, 1917, and 1918, with 20,000 of the total acreage in corn, wheat, and beans, the prices

of which were rising rapidly at the time. But stored water from the irrigation project was delivered and annual payments were due in 1915 for the first time. The irrigation project had been planned and under construction for many years before the World War, and an increase in crop acreage would have been necessary to pay for it, regardless of sweeping changes in the market. After the War, the increased production of corn, wheat, and beans was replaced by cotton. The chief function of the War, so far as this area was concerned, was to determine the particular crops which would be planted in the increased acreage rather than to stimulate increased crop acreage. It acted simply to provide an immediate means by which costs might be met, costs which had to be met in any case. Second, the immediate force in the development came from the imposition upon the area of a heavy financial superstructure in the form of a costly irrigation project. The role of the new \$6.00 per acre charge deserves close examination. Some light is shed on this role by several statements contained in a bulletin of the State Agricultural Experiment Station:

"Up to the time of the construction of the Elephant Butte Dam the Valley had been inhabited by Spanish-Americans and Anglo-Americans for many generations; and because of the environment, they developed their own peculiar type of farming to meet prevailing conditions.... After the Dam was constructed and the irrigation and drainage systems were completed, the land values increased to such an extent that it was necessary to adopt more efficient farming methods."(1)

(1) Bulletin No. 220; Agricultural Experiment Station of the New Mexico College of Agriculture.

The term "land values" in the above statement is apparently an euphemism for "fixed charges".

Further light may be shed by examination of the period 1920 to 1930.

In 1918, cotton was first introduced in the area on 600 acres. In the same year, the first cotton gin in the area was built at Tornillo. In 1919, acreage in cotton increased to 1,584. In 1920, after the 40¢ per pound paid in 1919, acreage in cotton rose to 15,314. Cotton dropped to about 16¢ per pound that year, and in 1921 only 3,832 acres in cotton were grown. Yields, however, were found to run well over a bale per acre on many plots and when the price received for the cotton grown that year rose to over 19¢, the boom was on. Cotton acreage rose to over 13,000 in 1922, to 36,000 in 1923, 59,000 in 1924, and to a peak of 105,000 acres or 76 per cent of the total crop acreage in 1929.

While cotton may have been introduced and enthusiastically accepted as an answer to the need for a crop of high commercial value, its net effect was to accelerate and intensify the processes set in motion in the preceding decade.

From 1920 to 1930 the number of farms doubled, and average crop acreage per farm declined slightly, indicating a further development toward more commercial farming. The number of farms under 20 acres increased more rapidly than

those over 20 acres, along with further development of sharecropping. Total crop acreage almost doubled, while cotton acreage increased from 2 per cent of the total in 1919 to 76 per cent in 1929.

The proportion of full owners to all farm operators decreased from 53 per cent to 51 per cent, and that of tenants to all operators increased from 34 to 42 per cent. The number of farms employing labor almost doubled, although the percentage of all farms employing labor declined slightly. Cash expenditures for labor almost tripled, with labor expenditures per acre of crop land rising from \$9.35 to \$14.38. These figures on the number of farms employing labor and the labor expenditures per farm and per crop acre minimize the actual amount of labor. Sharecropping, which is essentially an alternative method of hiring labor, is not taken into account. Sharecroppers are considered by the Census farmers, and the tracts operated by them, farms. The value of machinery per farm increased from \$456 to \$619. Expenditures for fertilizer per farm increased three-fold. The proportion of fully-owned mortgaged farms increased from 27 per cent to 51 per cent, and the total mortgaged indebtedness on fully-owned farms rose from just over \$1,000,000 to slightly under \$5,000,000. (See Table II)

Cotton completed the process initiated by the construction of the irrigation project: the process by which the commercially isolated and stable agricultural community of 1900 and 1910 was annexed to a commercial system of industrially organized production and a world market. In this process the irrigation project may be regarded not as a causal but as an instrumental factor. It was the instrument by which this essentially self-sufficing area was opened to commercial exploitation. The establishment, via this first investment, of a legal claim upon the resources of the area and the labor of its inhabitants, a claim which could not immediately be satisfied, led to the dispossession of the natives, and their replacement by American settlers financed by American capital. These settlers, with cash obligations to meet, and with aspirations toward a mode of living requiring large amounts of cash constituted a new and large market both for the sale of consumption goods and the investment of capital. The dispossessed Spanish-Americans, with no other means of livelihood than the sale of their labor, constituted the necessary cheap labor supply, supplemented by importation of labor from old Mexico. Since they were now to a greater extent dependent upon cash, they constituted an additional market for consumption goods. In addition, a large area not previously under cultivation was

Table II

CHARACTERISTICS OF AGRICULTURE - MESILLA VALLEY

	1920	1930
No. Farms	1596	3392
No. Full Owners	844	1718
No. Tenants	546	1288
No. Part Owners	145	314
No. Managers	61	72
Total Crop Acres	77,850	145,902
Average Crop Acres per Farm	49	43
No. Farms Employing Cash Labor	1,139	2,076
Cash Labor Expenditures per Farm	\$ 611.00	\$ 806.00
Value Machinery per Farm	\$ 456.00	\$ 619.00
Expenditures for Fertilizer per Farm	\$ 10.56	\$ 36.22
No. Fully-owned Farms Mortgaged	229	385
Mortgage Debt per Fully-owned Mortgaged Farm	\$ 4,597.00	\$ 5,640.00

subjugated, settled and put to intensive use.

The net result was that by 1930 the people deriving income from the agricultural resources were sharply divided into groups on the basis of their productive relationships. The relative returns to different groups were not determined by the labor expended by those groups. The returns to all groups were subject to forces far outside their control and so variable as to make livelihood insecure beyond any margin of security. Gross value per acre of cotton varied from approximately \$70 in 1921 to \$120 in 1922, to \$60 in 1926, to \$100 in 1927, to \$60 in 1930, and to \$30 in 1932, a variation over a range of 300 per cent within 10 years.

Farming in the area became much more of a gamble, but gamblers sometimes win. And win, a good many of these people did, in the years from 1922 to 1929, when the price of cotton stayed for the most part over 20 cents. A long-staple cotton was grown regularly, and yields consistently averaged about a bale to the acre, running as high as a bale and a half and two bales on some land.

The benefits of the high profits of these years were confined for the most part to a relatively small group of the entire population. Landowners sold their land which they had purchased, 10 or 15 years earlier, for \$10 at \$300 per acre.

Table III

CROP ACREAGE AND GROSS VALUE OF CROPS - RIO GRANDE PROJECT

	Total Area All Crops	Total Area in Cotton		Total Gross Crop Values	Gross Cotton Crop Values	
	Acres	Acres	% of Total Area in Crops	Dollars	Dollars	% of Total Gross Crop Values
1919	72,170	1,584	2.2	3,825,107	261,439	6.8
1920	76,871	15,314	20.0	(1)	1,161,107	—
1921	76,531	3,832	5.1	—	267,704	—
1922	84,413	13,319	15.2	4,479,627	—	—
1923	93,713	36,364	37.2	8,520,158	—	—
1924	103,115	58,721	56.8	9,624,572	—	—
1925	121,799	81,373	66.8	10,676,614	8,226,810	77.6
1926	128,858	83,337	63.6	7,760,894	5,231,897	67.4
1927	133,754	78,915	58.5	10,599,938	7,173,058	67.7
1928	139,598	104,109	74.6	12,808,287	—	—
1929	139,774	105,425	75.6	10,957,324	7,864,705	71.8
1930	139,707	94,865	67.9	8,184,665	5,734,589	70.1
1931	137,378	83,338	60.6	4,283,758	2,825,992	65.9
1932	134,531	71,056	52.8	3,539,326	2,140,917	60.5
1933	136,509	72,654	62.8	6,148,085	3,936,450	64.0
1934	123,822	63,918	51.6	9,417,534	5,231,835	55.6
1935	114,658	60,644	52.8	7,056,527	4,126,313	58.5

(1) Data not available.

Owners of farms over 40 or 50 acres achieved a living standard never before available to farmers in the area. A fair number of unsupervised tenants, too, enjoyed a little of the fruits of a boom market. The largest proportion of the population, however, sharecroppers on large farms and farm laborers, enjoyed no more ample livelihood than they had ever had. Nevertheless, the total population deriving what at that time was a relatively certain livelihood from the agricultural resources of the area was at least five times the population of 1910. In addition, large numbers of Mexicans were imported from across the border during the cotton-picking season to supplement the cheap labor which was insufficient for cotton-picking requirements. Further, a large wholesale and retail business flourished in El Paso and through the valley, such as had not existed in 1910.

At the present time, the total population contained within the area is approximately 160,000, though by no means all this number are dependent upon the agricultural resources. The City of El Paso with its smelters and cement plants, clothing factories, wholesale and retail houses, and other industrial and commercial activities has a population of over 100,000. The rural and village population is about 50,000, with some 28,000 people living on farms.

Approximately 7,000 persons are included in the families of farm owner-operators and approximately 12,000 in the families of tenants and sharecroppers. Over 60 per cent of the owner-operator families are Anglo-American; the other 40 per cent largely Spanish-American. Only 20 per cent of the tenants, however, are Anglos, the remainder being largely Spanish-American. Approximately 9,000 persons, nearly all Spanish-American, are in the families of hired farm laborers living permanently on farms. Six or seven years ago this number was higher. About 26,000 people live in the 39 small villages and towns in the area, scattered along the river. About 17,000 of them are principally dependent for livelihood upon farm labor: 6,000 upon permanent farm labor jobs and 11,000 upon seasonal farm labor. Of this 11,000, almost 5,000 persons are also dependent upon relief, 1,500 permanently and the remainder throughout the year, except at cotton-picking and cotton-chopping times. The other 6,000 persons dependent principally upon farm labor for cash income are not at present on relief. Many of these have small garden plots, ranging in size from a fraction of an acre to 3 acres. These people are not considered eligible for relief. In addition, during the cotton-picking season upwards of 2,000 persons, at other seasons on relief, are imported from El Paso to the farms. The bulk of the remaining village population and a good part of that/El Paso is indirectly

dependent upon the agricultural resources of the area by way of retail and wholesale trade, and the supplying of professional and other services to the farm population.

Table IV
POPULATION OF THE AREA

Total	160,000	
El Paso	106,000	
Village & Farm	54,000	
Total Village & Farm Population	54,000	
Farm Population		28,000
In Families of Owner-operators		\$7,000
" " " Tenants		12,000
" " " Farm Laborers		9,000
Village Population		26,000
In Families of Farm Laborers		17,000
" " " Others		9,000

There are now approximately 3,500 farms in the area, a little over half of them operated by their owners, one-third by tenants, predominantly sharecroppers, and about ten per cent by people who own a portion of their farms. A few farms are operated by managers. Some 70 per cent of these farms, comprising about 90 per cent of the crop acreage, are cotton farms, over 40 per cent of the total value of their crops being contributed by cotton. Only 4 per cent of all the farms, with about 1 per cent

of the total crop acreage, are of the non-commercial type, the operator either being primarily dependent upon some other activity or using over 50 per cent, by value, of his products himself. There are 40 livestock ranches in the area and none of these has any crop acreage. The remainder are commercial farms of various types, the most significant being dairy and truck farms. The average crop acreage of cotton farms is about 50 acres, but two-thirds of all cotton farms are less than 50 acres in size. Over one-third are under 20 acres. On the other hand, there are about 30 cotton farms which are over 500 acres, with a few being over 1,500 acres. (See Table V).

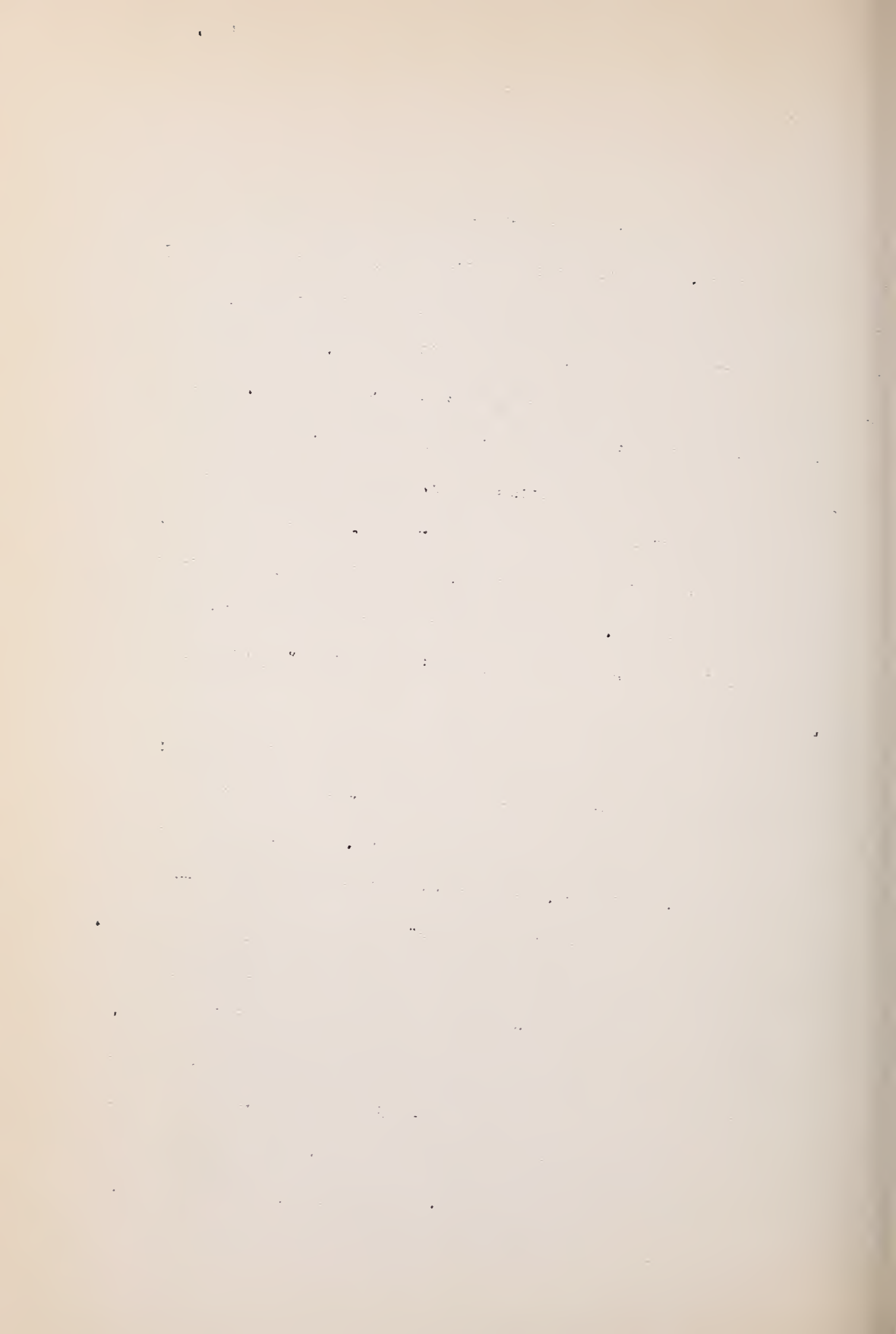
Table V

COTTON FARMS - BY SIZE OF FARM

	#	%
Under 10 acres	295	12.4
10 to 19 "	538	22.6
20 to 49 "	756	31.8
50 to 99 "	410	17.2
100 to 174 "	231	9.7
175 to 259 "	73	3.1
260 to 499 "	47	2.0
500 acres and over	29	1.2
Total	2,379	100.0

There are several distinct types of operation of cotton farms in the area. The very large cotton farms, those of several hundred acres, are operated in a manner almost identical with that of large cotton plantations in the Old South. Some of them parcel out their acreage in small plots to sharecroppers. The sharecroppers furnish their own equipment and seed; the owner pays the taxes and the water assessments. The tenant receives two-thirds of the crop and the owner one-third. In a few cases, the owner supplies equipment and seed, in which case he received 50 per cent of the crop. These large farms maintain commissaries from which their sharecroppers receive "furnishings" during the year.

Some of the very large farms do not use sharecroppers; instead, they employ their labor on a daily wage basis at a rate varying from ninety cents to one dollar a day. These hired laborers, like the sharecroppers, are furnished houses on the farms without charge and receive "furnishings" from the farm commissaries. There is a belief among many farm owners that hiring laborers is a cheaper method than the sharecropping system of obtaining labor. It is generally understood in the area that sharecroppers are permitted to "break even" once in a while. A few medium-sized farms, ranging from 150 to 500 acres, employ one or the other of these systems but do not have commissaries. In these cases, the sharecroppers are advanced cash with which they can buy whatever they



need at local stores. The operators of these medium-sized farms feel that there is something reprehensible about the commissary system. They also mention that their operations are not on sufficiently large a scale to warrant the commissary.

One-third the total number of farms in the area fall within the 20 to 50-acre class and almost another 20 per cent in the 50 to 100-acre class. This type of farm may be operated by an owner or by a tenant. These tenants ordinarily rent from absentee owners who bought small parcels of land during the 1920s purely as an investment. Many of these owners are professional or business people in El Paso; or, sometimes, in California and other distant places. The ordinary rental arrangement is on a one-third to two-third sharecropping basis rather than on a cash rent basis. Both owner and tenant regard this as a more satisfactory and safer rental arrangement than a pre-determined cash rent, in the face of the variability of cotton yields and prices. The operators of farms of this size, whether owners or tenants, ordinarily employ one or possibly two permanent farm laborers. The amount of farm labor done by such an operator does not appear to be great. These are the farmers who frequently appear at the office of the County Agent in white linen suits. Many of them came to this area without previous experience in farming. They operate their farms purely as business ventures from which they hope to obtain, without a great expenditure of labor time, sufficient cash to

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provide what would be regarded as lower-middle-class urban incomes. Their homes, which are scattered through the valley, are ordinarily new and distinctly suburban in appearance. They are equipped with gas, electricity, running water, and medium-priced automobiles. These farms are further distinguished by a noticeable scarcity of vegetable gardens, and barnyard livestock. In the words of the El Paso County Agent, "When they come in town for the afternoon, they want to stay for dinner or a show. They don't want to have to go home to milk the cow and feed the chickens."

Ordinarily, these farmers provide their permanent hired help with adobe huts on the farm. A few of those whose homes and living habits are more in the dirt-farming tradition prefer to have their Spanish-American laborers live in nearby villages. They disapprove of the practice of surrounding the farm home with a circle of adobe huts: "Too much like peonage", they grumble. At two seasons of the year, all of these farms hire additional labor, for chopping several weeks during the spring, and for cotton-picking from about the middle of September to the middle of December. This labor, recruited from the villages in the area for the most part, is paid at the going daily rate, \$1.00, for chopping, and 60 to 70 cents per 100 pounds for cotton-picking. The average adult, it is generally reported,

may pick approximately 200 pounds of cotton per day.

Another group of farms, ranging from 5 to 20 acres, comprises about one-third of all cotton farms. This group includes two distinct types of farms: a) those rented on shares and under supervision of a large operator; and b) those owned by Spanish-American operators whose families have owned them for periods of time varying from 30 to 100 years. On these farms there are no permanent hired laborers. The operator and his family perform all the labor, except for a part of the cotton-picking. For this, a few pickers may be hired for a short time. Most of these farmers, whether owners or tenants, live in adobe huts; and have relatively little machinery and equipment. A few of the owners in this group have no mortgages upon their land but are obliged to borrow sizable amounts to cover annual production costs.

Costs of production of cotton in the area are high at present. During the 1920s they were even higher. A survey by the Agricultural Extension Service in 1927 indicated that the cost of producing cotton on land which averaged one bale to the acre was just under 11 cents per pound. ⁽¹⁾ Actually, the cost was higher, since no account was taken of the \$3.60 construction charge made by the irrigation districts, only a current operation

(1) This figure was not applicable to farms under 20 acres where the bulk of the labor was performed by the operator rather than by hired help.

and maintenance charge being considered. Also, allowance was made for high interest payments on mortgages, since a large number of the farm owners bought their land during the boom at \$300 per acre and had to borrow to do so, but no account was taken of the high cost of borrowing money to cover the annual cash production costs of \$50 per acre.

Farmers found in the cotton-brokers who maintained offices in the area, Anderson-Clayton, R. W. Hoover, and others, willing lenders of not only \$50 per acre, but considerably more. This ready source of cash allowed the maintenance of high living standards. The borrowers contracted to deliver specified amounts of cotton in fulfillment of their loans. The brokers charged a standard rate of interest, about 6 per cent, on the money loaned, plus one dollar per bale as commission for handling; and, in addition, paid no premium on the long-staple cotton. In the open market, this premium was sometimes as much as a half-cent per pound. The total charges averaged from \$4.00 to \$8.00 per acre or 10 to 15 per cent on the money loaned. Very frequently, farmers, after delivering all of their cotton remained still indebted to the brokers. The remaining indebtedness functioned to compel the farmer to contract with the broker again the following year.

So long as the price of cotton remained over 20 cents,

owners of medium-sized farms could operate under this arrangement satisfactorily. Their indebtedness may have been heavy, but they could and did spend large amounts for living, and continued to operate their farms.

This area was not exempt, however, from the decline of prices in 1929 and thereafter. During the years 1930 to 1933, inclusive, the price of cotton dropped and the return to farmers dropped. Fixed charges remained relatively constant and could not be met; farm labor wages dropped; land changed hands rapidly; and many small owners, tenants and laborers found themselves destitute.

The total gross value of crops in 1931 and 1932 dropped to less than \$4,000,000 from the \$8,000,000 to \$12,000,000 of the preceding years. Wages to farm labor dropped from \$1.25 per day to \$1.00. A moratorium on the construction charges had to be declared by the two Irrigation Districts in the area, reducing the annual per acre water charges from about \$6.00 to about \$2.50. The percentage of assessed rural acreage in the area upon which taxes were delinquent rose from 9.7 in 1929 to 18.4 in 1930, 25.0 in 1931, and 32.1 in 1932, all of which was still delinquent on February 1, 1934. Foreclosures by mortgage-holders were rare; but sale and refinancing of farms was extensive. Coincident with the failure of several rural banks, mortgaged indebtedness was cut in half. Turnover of

farm operators, particularly tenants, was speeded up. Displacement of permanent farm laborers swelled the relief rolls. In almost every respect, the area shared the experience of the rest of commercialized agriculture in the United States.

At the present time, with mortgaged indebtedness reduced, a moratorium on the construction charge of the irrigation project, labor costs lower, and other expenses down, the cost of producing cotton on land yielding one bale to the acre is estimated to be about $5\frac{1}{2}$ cents per pound (\$27 per acre) for farm operators owning their land. The actual cost is higher since, according to the manager of the Production Credit Association, only 20 per cent of the farmers in the area have sufficient cash to take care of their annual production costs. The remaining farmers borrow an average of about \$20 per acre during the year. The cost of this annual credit for some farmers is now lower than it once was, however; they can now borrow from the Production Credit Association at 6 per cent up to \$30 per acre provided they have sufficient equipment and machinery to offer as collateral. At this rate, the average cost of production for owners is about five and three-quarters cents. A great many farmers, however, have insufficient collateral to use the facilities of this organization and are still borrowing at the old rates from the cotton brokers. The brokerage firm of

Anderson and Clayton still operates 4 of the 6 gins they once operated to handle cotton they receive on contract. For farmers financed by these brokers, average costs run slightly over 6 cents per pound.

For tenants, there is an additional charge representing the absentee owners' profit on his land investment. This charge, with cotton at 10 cents per pound, is about 1 cent, raising the average cost of production for tenants to between six and three-fourths and seven and one-fourth cents per pound.

On the basis of these figures, the average owner in that group operating between 20 and 50 acres might earn, with 30 acres in cotton and a price of 10 cents, about \$600. A tenant under similar circumstances might earn about \$450. Farm owners having 3 to 20 acres, by performing practically all labor themselves, with cotton at 10 cents, may earn from 15 acres in cotton about \$450. Sharecroppers might, similarly, earn from 15 acres in cotton about \$350 or less, depending upon the arrangements under which they received furnishings from their commissaries.

The 3,500 families dependent upon permanent farm labor jobs may earn \$300 per year, or perhaps \$350 if the entire family works during the cotton-picking season. Another 2,500 families dependent on farm labor for cash income earn much less—from perhaps \$50 to \$150 per year. Their remaining income

is supplied either by small gardens or by relief. Measures are taken, however, to see that relief does not impair the availability of this labor during the season in which it is needed. All relief projects are shut down several weeks before the cotton-picking season opens, and persons choosing to scrape through the season in some way rather than to pick cotton at the usual rates are informed at the relief offices that they may scrape through the rest of the year as well.

In sum, in spite of local publicity such as an article in the EL PASO TIMES of October 26, 1936, which says: "Upper Valley Prosperous....Highly cultivated farm lands, many with beautiful homes occupied by as prosperous a class of farm families as are to be found anywhere....", that section of the agricultural population which has a family income of over \$1000 per year is limited to 4 or 5 thousand people of a total of about 45,000. The rest earn less, with probably 35,000 dependent on family incomes of under \$600, 15,000 of them on incomes under \$300.

Confirmation of the inadequacy of the incomes of the bulk of the agricultural population is found in the report of the U. S. Census that 46 per cent of all tenants in the area have operated their farms for less than one year; 60 per cent have operated their farms one year or less; 75 per cent, 3 years

or less; and 80 per cent, 4 years or less. Among owners, too, 23 per cent had operated their farms 2 years or less, and 34 per cent, 4 years or less. (See Table VI).

Still another indication of the insecurity of the position of farmers in the area is found in the relative acreage devoted to cotton and alfalfa; cotton in 1929 occupied 75 per cent of the crop acreage, alfalfa, between 15 and 20 per cent. Between 1929 and 1935, after 5 to 10 years of cotton cultivation, many farmers received warning signs in the form of reduced yields of cotton. It was learned that unless alfalfa was rotated with cotton about every 5 years, cotton yields declined sharply. With high production costs, a decline from a bale or a bale and one-fourth to three-fourths of a bale was extremely serious. Between 1929 and 1935, cotton acreage had been reduced to about 50 per cent of the total acreage. Acreage in alfalfa, however, still represented only about 25 per cent of the total. Those farmers financed by the cotton brokers were subject to pressure in the direction of maximum acreage in cotton. This pressure was adequately counter-balanced, however, by pressure in the opposite direction from 2 sources; 1) that from the Federal Government's efforts to subsidize reduction of cotton acreage and to penalize surplus cotton production by a tax of 4 cents a pound on all surpluses produced; 2) pressure from absentee landowners who realized the drop in the value of their investment

Table VI
YEARS ON THIS FARM BY TENURE - 1935
Dona Ana and El Paso Counties

	<u>No.</u>	<u>%</u>
Owners (full)		
Under 1 year	202	10
1 year	137	7
2 years	118	6
3 years	98	5
4 years	126	6
5 to 9 years	543	28
10 to 14 years	280	15
15 years and over	445	23
Total	1,949	100
Tenants		
Under 1 year	541	46
1 year	166	14
2 years	88	8
3 years	77	7
4 years	63	5
5 years and over	233	20
Total	1,168	100

which accompanied destructive use of the land. Nevertheless, cotton acreage is still far from balanced with alfalfa acreage, there being some 60,000 acres in cotton as opposed to 27,000 in alfalfa. Farmers report that they would like to establish a perfect balance on their farms but cannot afford to do so. Returns from cotton are, or at least may be, higher than those from alfalfa by virtue of the limited local market for alfalfa which prevails.

This area, thirty years ago, supported a small, native Spanish-American population, largely self-sufficient and secure. Neither its population nor its land and water resources, under that non-commercial system of use, provided large opportunity for profit to the expanding commercial structure and its southwestern outposts. Through the construction of a costly irrigation project, three principal things were accomplished: 1) an additional land area of 100,000 acres was made available for agricultural use; 2) the native population unable to meet the new high cash costs was in large measure displaced from 50,000 acres it had owned; 3) the new owners of the land were obliged, by virtue of the new high cash costs, to institute a highly commercial and intensive type of land use.

The land speculation which was rife during the construction of the project and after its completion drove the cost of land so high that the annual cost of carrying the indebtedness

incurred in the purchase of land, plus the high cost of water, made the choice of a crop bringing high cash returns inevitable. Cotton brought these high returns for a time; it also brought the insecurity attendant upon dependence on a crop subject to wide variation in price, and it brought the need for a large labor supply. The result, at the present time, is that the area contains a large but highly stratified population directly dependent upon the land resources, either as farm operators or farm laborers. This population, in consequence of the devotion of the land to the production of cash crops, constitutes a large and presumably profitable market for commercial purveyors of all types of goods, services and capital. A small minority of the resident population has a relatively high living standard but so much insecurity that its activities may be most accurately characterized as gambling, with the stakes high income versus bankruptcy. The great majority of the resident population is supported at a permanently low income level and a high insecurity level.

Several types of subsidy have been extended to the area by the Federal Government. A portion of the income of the low-income group comes in the form of relief amounting to \$250,000 per year from the Federal Government. This is a subsidy one of whose effects is to maintain the large seasonal labor supply

necessary to cotton production.

Benefit payments from the AAA totalled \$675,000 in this area in 1935. The records reveal clearly that the bulk of these payments accrued to the large land-owners. Small land-owners and tenants did not share in this subsidy.

The amount still due the federal government for construction of the project is over \$10,000,000. The chances that this debt will remain unpaid and become a permanent subsidy are extremely bright. In sum, not only does the major share of the benefits derived from the natural resources of the area go to a numerically small group of the entire population, but the same share of various subsidies from the Federal Government goes to this same small group.

SUMMARY

The Rio Grande watershed is one of the major western watersheds. As here defined it extends from the San Luis Valley in southern Colorado to the lower end of the El Paso-Juarez Valley in western Texas, and has a width of approximately half that of the State of New Mexico. Almost half the State of New Mexico, a large part of southern Colorado, and a small portion of the western corner of Texas lie within this drainage basin.

Within the watershed population is relatively small; it is one of the oldest areas of human habitation in the United States. The present population includes three distinct ethnic groups, native Indian, Spanish-Americans, and Anglo-Americans, who have occupied the area in the order named. El Paso with 100,000 and Albuquerque with about 30,000 are the only towns in the watershed with a population of more than 15,000. The bulk of the population is rural and primarily dependent upon the agricultural use of the land. The largest part of it is concentrated in small settlements along the rivers adjacent to irrigated lands. The surrounding lands of the watershed are largely semi-arid and offer only limited possibilities of use in dry farming. They are at the present time largely used as range land upon which large numbers of cattle, sheep, and goats are grazed. Approximately half of this range is publicly owned.

Irrigation agriculture, which has been practised in some portions of the watershed for over 800 years, is the major source of income for the bulk of the population. Live-stock grazing, though a much smaller number of people are principally dependent upon it, is another important source of income. The use of the range for this purpose dates back about 300 years to the earliest Spanish emigration. By 1800 the operation of large flocks of sheep was an important part of the economy of that portion of the watershed which now lies in the State of New Mexico. By 1860 large herds of cattle abounded, and evidences of overgrazing in the form of rapidly-cutting arroyos and depleted ranges were observed. The effect of this use was brought to a sharp focus in recent years when it was realized that almost half the irrigated lands of the middle portion of the Rio Grande Valley had been rendered useless through the silting of stream beds and the periodic changing of the channels of the main streams. As a result, an attempt was made to repair the loss through the efforts of the Middle Rio Grande Conservancy District. The attempt was, by and large, successful in reclaiming much of the destroyed agricultural land, but the basic destructive agency--overuse of the adjoining range lands--continues, and its effects constitute an ever-increasing threat to the livelihood of the great part of the population of the Rio

Grande watershed.

While physiographically all of the lands drained by the Rio Grande may be susceptible of unitary consideration, there are distinct differences among different areas within the watershed in terms of human use of resources. On the basis of these differences it is possible to readily distinguish five areas within the Rio Grande watershed, each of which is characterized by internal homogeneity as to dependency upon resources. Each of these areas contains a centrally important agricultural area surrounded by semi-arid range and forest lands. These areas are, as indicated on the accompanying map, the San Luis Valley, the Jemez-Tewa Valley, the Middle Rio Grande Valley, the Estancia Valley, and the Mesilla Valley.

The area directly below the headwaters of the Rio Grande contains the most extensive cultivated lands of the watershed. Six hundred and fifty thousand acres of irrigated land and six or seven times that amount of range and forest land form the San Luis Valley.

The San Luis Valley is similar to many other agricultural areas in the United States. Those associations of characteristics which best describe commercial irrigation farming in the United States are equally descriptive of the San Luis Valley. Its farms are relatively large, its costs of production are high despite a very low operation and

maintenance charge on all irrigated lands. It is heavily mortgaged and insecure as to tenure. The investment in machinery is heavy and the expenditure for labor large. Land taxes are habitually delinquent. Farmers necessarily speculate in both land and markets. The most important relationship in the life of the area is the annual relationship of the crop to the market price. Farm operators are neither exclusively owners nor exclusively tenants. The owners of land and livestock are subject to all of the risks of a business enterprise. They operate at a profit one year and with a deficit the next. They wager profits against bankruptcy with the odds always slightly in favor of bankruptcy.

The crops which annually determine the success or failure of the agricultural enterprises of the San Luis Valley are potatoes and livestock. The majority of the irrigated land in the San Luis Valley is in forage crops and provides an important resource in cheap supplemental feed to the stockmen of the Valley. At an elevation of 7,500 feet, winter grazing is hazardous and uncertain. Although there is a considerable reliance on public domain and private grazing land for winter feed, 250,000 acres of natural hay land and an extensive production of forage constitute a major source of winter feed. The use of range and the operation of livestock is largely commercial. Although it does not feature any

very large stock operations, its conduct is primarily determined by the fluctuation of the livestock market.

In so speculative an agricultural area as the San Luis Valley, the first requirement is a stable market and an adequate return. So far as the lands in the San Luis Valley are concerned, their preservation carries no guarantee of livelihood.

Of a totally different nature from the San Luis Valley is that part of the Rio Grande watershed lying north of Bernalillo and extending through the central part of the State of New Mexico north to the Colorado line. It is one of the oldest areas of human occupation in the United States. The predominantly Spanish-American and Indian population is relatively dense, concentrated in small villages, with its primary dependence on the limited irrigated lands along the permanent water courses.

The range lands of the area are predominantly publicly owned. Of all the range lands, only a meagre portion of the lower lying lands are available to the village population. The higher ranges, almost entirely in Federal ownership, are principally used by a few large stockmen operating sheep. Customarily, the herders for these larger stockmen are employed on a sharecropping basis, obtaining a loan of a breeding herd from the large owner and returning yearly twenty lambs for

every hundred ewes.

In the area, which is here designated as the Jemez-Tewa Valley, both the Indian and Spanish-American population belong to low-income groups. Agriculture is principally non-commercial, directed more toward the provision of a basic food supply than toward a marketable crop. The major portion of the people obtains a small amount of cash through labor or government assistance in order to purchase products not producible in the area. This characteristic of the economy of the village population was brought to a sharp focus by the depression and by the virtual disappearance of a market for labor. Agriculturally, the people remained much the same, but a majority were forced to seek government assistance to fulfill a small but insistent requirement for cash.

Probably no more destructive use of resources has occurred in the whole Rio Grande watershed than in this area. Because of continued occupation and because of an increasing, dependent population, soil and moisture loss has produced one of the most striking areas of erosion in the Southwest. Destructive use of resources here occurs not because of a lack of knowledge but because of the absence of resources to provide an adequate livelihood. To achieve conservative use of the land resource, a program of land use adjustment is

required. Such a program must recognize that education is insufficient in an economy which provides such a limited resource to so large a population, and be prepared to undertake the only measures which will permit conservative use to an overdependent population--the provision of additional resources.

Lying immediately south of the Jemez-Tewa Valley and extending to the Elephant Butte Dam is that portion of the watershed called the Middle Rio Grande Valley. Here also are concentrations of Spanish-American and Indian population which constitute a majority of the population of the area.

This area likewise is an area of early settlement and continuous use and would have been virtually indistinguishable, as an area of human occupation, from the Jemez-Tewa Valley had it not been for certain relatively recent developments.

The Spanish-American and Indian population had developed, in the course of centuries of occupation, a village culture and a village economy. The economic universe was small, the division of labor simple. There was a direct relationship between the productivity of the agricultural resource and its capacity to support a population dependent on it. The Spanish-American and Indian farmers provided their own market and lived relatively securely.

Technology was simple, residence continuous, land virtually inalienable. Costs of production and investment in land were measured in outlay of effort rather than in outlay of cash. Agriculture and handicrafts were a manner of living and not a business enterprise.

But it is impossible for any people, no matter what their cultural equipment, permanently to resist encroachment from a technologically superior and economically dominant group. Each man who possesses a resource which cannot be invested in, each man who possesses a capacity to work which cannot be bought, is at variance with the fundamental premises of the prevailing economic system. The purpose for which wealth is accumulated is the investment of that wealth in someone's labor, or in someone's land. The purpose of investment is to maintain permanently that state of financial obligation which will, by law, require that the productive worker perpetually share the products of his labor with someone who has acquired a legal title to that share.

The Spanish-American population of the Middle Rio Grande Valley persisted in their older economy for many years after American occupation. They neither sold nor mortgaged their land but only their labor. Even at present, no more than six or seven per cent of the farms are mortgaged, whereas for the nation as a whole, the percentage is well over forty.

But what was not accomplished singly--by individual farm and individual mortgage--was easier of accomplishment collectively. In 1929, the Middle Rio Grande Conservancy District was formed as a semi-public agency to drain the seeped agricultural lands of the Middle Rio Grande Valley and to provide a regular water supply to all of the irrigable lands of the middle valley.

Overnight, there occurred what for centuries the Spanish-American and Indian populations had contrived to escape. Every piece of land in the Conservancy District was assessed. The annual charges for construction, operation, and maintenance constituted a levy both for interest and principal on a total assessment which is, in effect, a mortgage secured by land.

This mortgage as it operates is not limited in its effects to any particularized section of the population within the district, nor to any ethnic group. The present water tax delinquency on 70 per cent of all tracts of agricultural land is not markedly selective.

The present annual assessment is predicated upon a 90 per cent collection. Yet, the collection on agricultural lands has been less than 30 per cent of the assessment. The Conservancy District operates under a limited joint liability principle. While delinquency increases, the tax rate will

increase. The ability of those landholders who are delinquent to meet their assessments will not be increased by this measure. The ability of those non-delinquent landholders will, all other things being equal, decrease. The process is unremitting. The greater the delinquency the higher, within legal limits, the assessment. The higher the assessment the greater the delinquency.

Preliminary evidence indicates that delinquency is slightly less on smaller tracts of land. Insofar as the size of the land holding represents a reliable measure of the commercial nature of the agricultural enterprise, this may be taken to indicate that the non-commercial village population has been better able to meet the burden of increased taxation than has the commercial farming population of the area.

Two factors may be held primarily responsible for this condition. The first of these consists in the simple fact that the larger the acreage assessed the greater is the aggregate indebtedness. In an economic situation which cannot support the heavy per acre charge, which the Conservancy District imposes, it is relatively less advantageous to own 50 acres than it is to own 5.

The second factor which is closely related to this

is that the problems of livelihood of the small land owner in the Middle Rio Grande Conservancy District are not met exclusively by reliance on agriculture. The Spanish-American population of the valley is not only an agricultural population but also a wage-earning population. Those tax assessments which are met are met as much by recourse to wages as by recourse to sale of farm produce.

The Middle Rio Grande Conservancy District has not been in operation many years and it would be premature to describe its effects. Nevertheless, a present water tax delinquency on 70 per cent of all tracts of agricultural land in the district foreshadows disturbing events in the future.

The Estancia Valley lies south and east of Albuquerque and represents a drainage which, although within the Rio Grande watershed, contributes no water to the main stream of the Rio Grande. All precipitation drains to the center of the valley.

Relatively few large areas of dry-farming exist in the Rio Grande watershed, the most important of these being the Estancia Valley which contains nearly 100,000 acres in crop land.

The agricultural activity which is most closely associated with the Estancia Valley is the production of dry pinto beans. In 1930, 75,000 acres or about 75 per cent of the crop land of the Valley was given over to the production of beans.

Here, as elsewhere in the commercial farming areas of the Rio Grande watershed, farming is a highly speculative undertaking. In the Estancia Valley, one more variable causing greater speculation is added due to the uncertainty of a water supply.

Farms are relatively large in the Estancia Valley with a tendency toward increasing acreages and more uncertain yields. Although not as highly commercial, measured by the expenditure per farm for labor and machinery, as the San Luis Valley or the Mesilla Valley, in the Estancia Valley farming is still a thoroughly commercial activity. About half of the farmers have tractors. This use of tractors is a result of large cultivated acreages per farm and in itself tends to increase the amount of cultivated acreage even more due to the decreased per acre costs of additional cultivation.

The price of beans which is the major concern of the Estancia Valley has varied from two to eight cents a pound. Inasmuch as the land, climate, and available water dictate the cultivation of beans year in and year out, there is only a limited opportunity to adjust the crop to the market. If prices are poor one year, the acreage in beans is likely to increase the next, in contrast with the usual tendency of acreage to decrease with declining prices. Serious losses one year only serve to double the stakes the next year; the annual hope is to

find the rare combination of high price and a bumper crop.

The physical environment is characterized by high winds, low rainfall, and types of soil readily susceptible to wind erosion. The frequent and severe dust storms which are so much a part of the Estancia Valley offer testimony to the nature and extent of the erosion which is occurring. But the process is unrelenting. The less the return, the larger the acreage; and the greater the return, the larger the acreage. More and more land is plowed and more and more dust blows. Residents of the Valley have watched its decline within a single generation, and have no choice but to continue the practices which have so markedly contributed to the destruction now a part of the life cycle of the Estancia Valley.

The ultimate verdict on commercial dry-farming in the Rio Grande watershed cannot yet be rendered. The indications, however, which are now available for the Estancia Valley offer scant promise. The farming population and the lands they are farming have had no lengthy past. Their future may be no more lengthy under present conditions. Their decline may be rapid and coincident.

The Mesilla Valley lies, for purposes of this discussion, immediately south of the Elephant Butte Reservoir and extends to Fort Quitman, Texas. All of the agricultural lands are along the main channel of the Rio Grande and are supplied by water impounded in the Reservoir. Almost 185,000 acres are supplied

with water, 25,000 acres of which are in Mexico.

The area is semi-arid and is characterized by sparse vegetation now in a state of severe depletion through constant overuse. The lands adjoining the irrigated farms along the middle of the Valley are mostly semi-desert ranges with relatively low carrying capacities. The area of ranch operations is comparatively great and the number of people dependent upon raising livestock very small in comparison with those dependent upon farming.

Prior to the creation of the two irrigation districts now using water from the Elephant Butte Reservoir, farming, in the area, was diversified, most of the farming population being Spanish-Americans who worked their lands primarily to fill their own needs rather than the needs of a national market. Accompanying the introduction of the highly capitalized irrigation districts, a marked change in the type of farming occurred. This change was consistently in the direction of a highly commercialized type of farming. Dispossession of many of the original Spanish-American owners, sharp increases in tenancy, in size of farms, in employment of farm labor, in cash expenditures for fertilizer, machinery and irrigation water occurred from 1910 to 1920. The trend from 1920 to 1930 has been equally marked. Through the institution of the irrigation district and the accompanying cash demands upon the land and its owners, the once isolated area became attached to the commercial economy of

the nation.

The particular cash crop around which this change centered was cotton. After 1923 cotton, as the major cash crop, was dominant. Its byproducts, a high percentage of farm mortgages, a large farm labor population, and a further increase in tenancy, were evident. The large proportion of the population, as farm laborers or sharecroppers, were almost entirely dependent upon the sale of their labor to the smaller group of farm owners and, with an abundant labor supply, obtained consistently low income. The farm owners, so long as cotton prices remained high, reaped the profits in the form of higher incomes and better living standards, though many, with less initial capital, found themselves sharing astonishingly large proportions of their returns with those from whom they borrowed cash to finance their operations.

With the drop since 1930 in cotton prices, a sizable portion of the farm labor population has become partially or wholly dependent on relief, and the incomes of the farm labor group as a whole have dropped still lower. Many of the small farm owners have either lost their land or retained it only at the expense of sharp reductions in their living standards. The very small minority of large owners, who have been the chief beneficiaries of the recent governmental assistance to agriculture have suffered less. Despite lower profits and greater

insecurity and despite the appearance of warnings in the form of lower yields on land constantly planted to cotton, cotton must continue to be the major crop. Markets for other crops producible in the area are too limited to permit the return essential to cover the high cost of operation.

The area supports a large and highly stratified population, the major part of it at a permanently low income level and a high level of insecurity. A minor part has relatively high living standards, but marked insecurity because of the cash outlay necessary to production and the instability of the cotton market.

The Rio Grande watershed contains several sharply contrasting areas: on the one hand, several areas characterized by the economic instability attendant upon commercial farming in the southwest; on the other hand, one area of non-commercial use, peopled principally by native Indians and Spanish-Americans, and chiefly characterized by a scarcity of resources in relation to population. Still another area is in a stage of transition between the two other types. The watershed as a whole is signalized by a relatively narrow resource base, at present in the process of further constriction. On a purely per capita basis its resources compare unfavorably with most of the other areas of the nation. The distribution of the agricultural resource is such that, in the areas of commercial

use the bulk of the cultivated land is controlled by a minority of the population, and throughout the watershed as a whole the range resource is so controlled. The result is a further narrowing of the basis of livelihood of the greatest portion of the population.

The period of expansion for the Rio Grande watershed is virtually over. Water, which once had seemed an indefinite resource is now the subject of court litigation between three states competing for a limited water supply. The permanent availability of cheap land, which had once been considered the perpetual guarantee of economic democracy, is now a legend. The land and water resources of the Rio Grande watershed are now almost fully developed.

This development has not secured economic democracy nor a sufficiency of income to the population dependent on the lands within the watershed. The commercial farming populations are engaged in a business enterprise with a high incidence of failure. The non-commercial farming populations are being rapidly converted into a wage working population which, considering the limited labor opportunities present in the area, is convincing testimony of the inadequacy of the agricultural resources for the support of a dependent population.

The material presented in the above description is not complete in detail, nor does it cover every element in the areas



of consideration. It represents a selective treatment of the major characteristics of human dependency in those areas, and an initial attempt at definition of the major problems.

